THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

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GAS PURIFICATION
BY
OXIDE OF IRON.

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CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
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RESISTS
SULPHURETTED HYDROGEN.
Does not Blister, Crack, or Flake off.
Has very large surfacing powers.
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THOMAS PROUD,
BROOKFIELD GAS APPARATUS WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM.
CONTRACTOR FOR
LAYING MAINS
FOR
Gas, Water, & Sanitary Purposes,
AND MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS AND PURIFIERS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
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Established at the commencement of Gas Lighting,
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THREE PRIZE MEDALS,
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MANUFACTURERS OF
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CAST & WROUGHT IRON TANKS FOR DITTO,
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Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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Roofs, Girders, and Bridges, and General Smith's Work
London Offices: 97, CANNON STREET—
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THE
"OTTO" GAS-ENGINE.
See Advertisement in last week's JOURNAL, page 230.

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THE
DUKE OF HAMILTON'S
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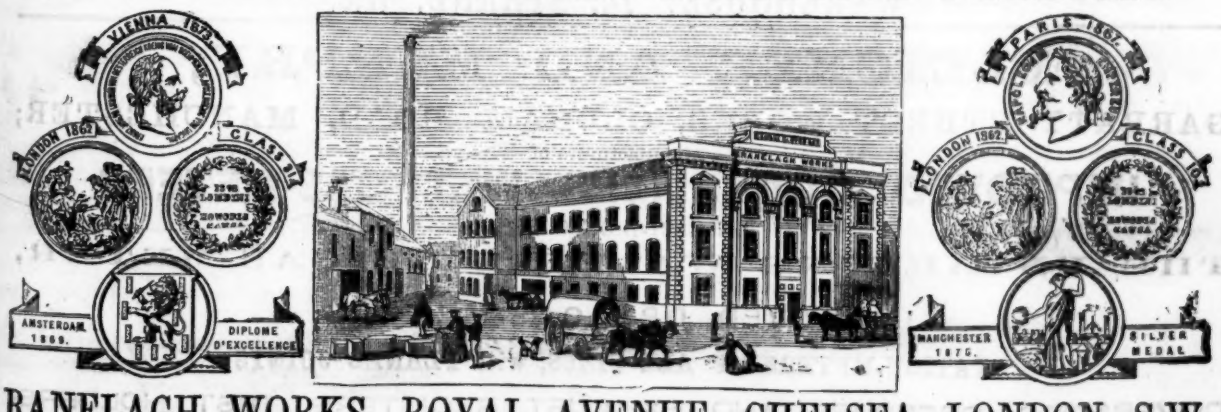
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

CHANGE OF ADDRESS.
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:



RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

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Manufacturers of W. J. WARNER'S PATENT MARKET GAS STAND-PIPE.

Now ready, GAS CHANDELIER BOOK (Reduced Prices), 7s. 6d.

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WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

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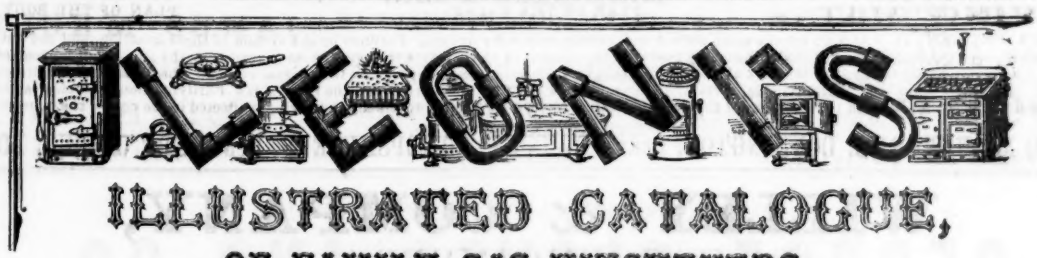
MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.



OF FAMILY GAS KITCHENERS,

COOKERS, HOT-PLATES, STOVES, BATH-BOILERS, &C; SENT FREE.

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WAREHOUSE: 74, STRAND, W.C.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

THE WIGAN COAL & IRON COMPANY,

LIMITED,

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

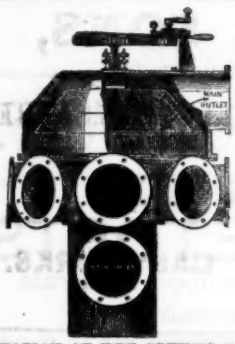
"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

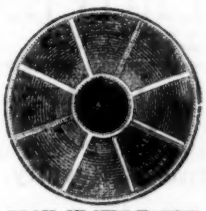
Full particulars will be sent on application to above address.

C. & W. WALKERS'

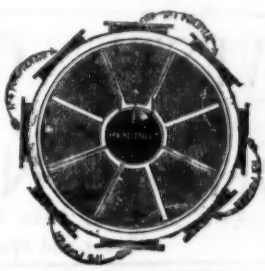
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

GAS PURIFICATION
BY
OXIDE OF IRON.
GAS PURIFICATION & CHEMICAL Co., LIMITED,
PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

MESSRS. NEWTON, CHAMBERS, & CO.,
THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,
PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY.
LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,
And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

EDWARD COCKEY & SONS,
GAS ENGINEERS, FROME SELWOOD,
MANUFACTURERS OF ALL DESCRIPTIONS OF

APPARATUS CONNECTED WITH GAS-WORKS.
THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

DRY-FACED VALVES
FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

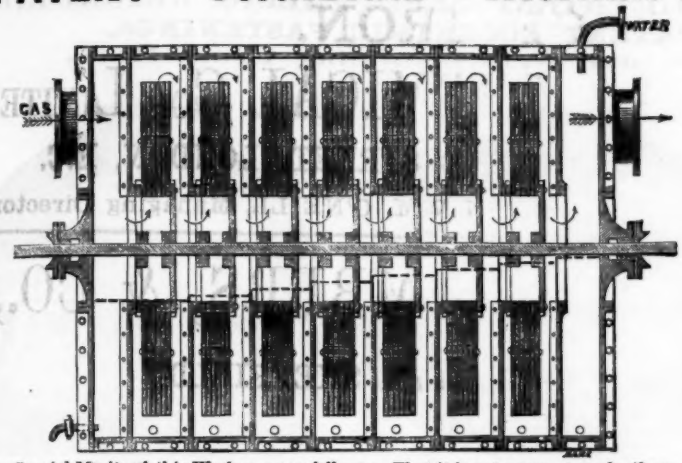
They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

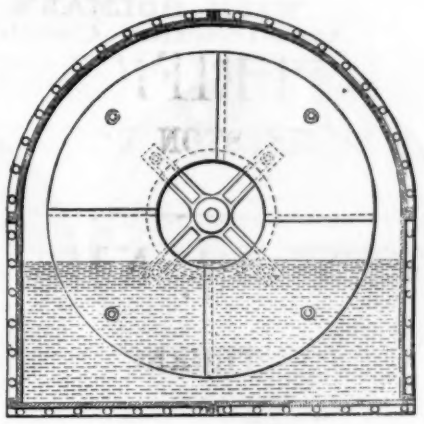
References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER COMPANY.





The Special Merits of this Washer are as follows:—That it is not necessary to reduce the temperature of the gas to 60°, or thereabouts, to make it effective; and that as no tar is retained in it, the illuminating power is not reduced as in Tower Scrubbers. That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas as it ascends. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine, as well as a very large quantity of carbonic acid and sulphuretted hydrogen. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

Messrs. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan.* 14, 1879.

Gentlemen,—In reply to your inquiry, I am pleased to say the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a week's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c., (Signed) JOHN CLARK, Engineer.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 7	11	9	7	5½	3½	3	1½	1½	½	0	10 Gallons.	59,000	Nil.	74°	66°	31°	25	23½	5
„ 8	9½	7½	6	4½	3	2	1	½		0	10 „	78,000	Nil.	73°	61°	31°	28	26½	4½
„ 9	11	9	7	5	3½	2½	1½	1	½	0	10 „	82,000	Nil.	74°	67°	33°	27½	25½	5
„ 10	10½	8½	6½	5	3½	2½	1½	1	½	0	10 „	66,000	Nil.	76°	64°	28°	25½	27	3
„ 11	12½	10	7½	5½	4½	3½	1½	1½	½	0	10 „	61,000	Nil.	73°	64°	27°	26½	25½	5
„ 12	11	8½	6½	—	—	—	1½	½	½	0	10 „	39,000	Nil.	74°	64°	27°	26½	25½	5
„ 13	13	10½	8½	6	4½	3½	2	1½	½	0	10 „	78,000	Nil.	75°	65°	42°	28	26	5

Messrs. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May* 28, 1879.

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March* 6, 1879.

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				10	9	8	7	6	5	4	3	2	1	
64,000	Inlet	2·00	2·00	158·8	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·15	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

Messrs. KIRKHAM and HERSEY. *The Leeds Corporation Gas-Works, Meadow Lane, Aug.* 14, 1879.

Gentlemen,—In reply to your inquiry of yesterday's date, I have pleasure in stating that the item appearing as income derivable from Ammonia in my estimate of revenue for current year is not an exaggeration. Our average income from Ammonia is 2s. 8d. per ton of coals carbonized, but at the works where your invention is in use we derive not less than 3s. per ton. Since the introduction of efficient Scrubbers at our works the greater yield of this product (now twice as valuable as coke to us) is such that the cost of Apparatus for its extraction can be wholly paid for out of from nine to twelve months gains. I am, Gentlemen, yours faithfully, (Signed) H. WOODALL, Engineer.

Messrs. KIRKHAM, HULETT, and CHANDLER. *Woolwich Equitable Gas Company, Engineers Office, Nov.* 1, 1879.

Gentlemen,—In answer to your inquiry respecting Washer erected here in September last, and which has been working here constantly since Oct. 1, I beg to say that it is working very satisfactorily. We sell over 24 gallons of 10 oz. liquor per ton of coal carbonized, and depend upon your Washer to extract all Ammonia, which it does satisfactorily, not leaving a trace of free Ammonia at the outlet. It takes little power to drive it, and the difference of pressure between inlet and outlet is scarcely noticeable, being less than half an inch. I consider it a very valuable machine, and have little doubt that it will pay for the outlay in a very short time. I shall be pleased to show it to any one that may be in want of such a machine, when they can see its capabilities themselves.—I am, Gentlemen, yours faithfully, (Signed) W. WHITE, Engineer.

Messrs. KIRKHAM and HERSEY. *Heywood Local Board Gas-Works, Hooley Bridge, Heywood, Dec.* 1, 1879.

Gentlemen,—In reply to your favour of the 28th ult., I beg to state that the Scrubber is at work, and doing well. I shall be glad to show it to any inquirers.—Yours truly, (Signed) EDWIN BUCKLEY, Engineer.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Dec.* 19, 1879.

Gentlemen,—In accordance with my promise that I would inform you as to the working of the "Standard" Washer erected by you here in June last, I now write to say that we are passing through it 100,000 cubic feet per hour (the quantity for which it is made) direct from the Condensers, "bye-passing" the whole of our Scrubbers, which, not being needed, have been standing still since the "Standard" Washer was put in use. It seems as though the Washer more effectually removed the Ammonia when taking the full quantity of gas than less; as, at the present time, at the sixth chamber (there being eleven in all) not a trace can be discovered either by turmeric or acid litmus paper. The difference in pressure between inlet and outlet is only ten-tenths of an inch. I need scarcely say, after the above, how perfectly satisfied I am. (Signed) P. J. WATES, Engineer.

For further particulars and testimonials, address Messrs.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

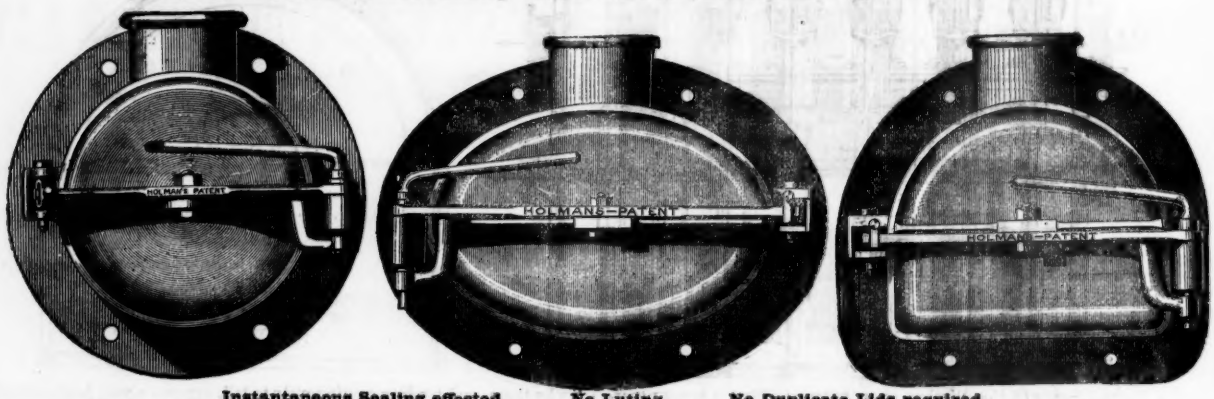
TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and Self-Sustaining Cross-Bars.



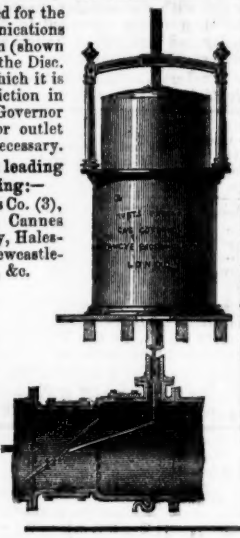
Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Morton's Patent Retort-Lids are in use in nearly all the Principal Gas-Works in the United Kingdom and the Colonies; also on the Continent and in the United States of America. They are now made of the

SAME FORM OR SECTION AS THE RETORT. (See Illustrations above.)

Engineers preparing Specifications of New Works will be furnished with Dimensions of Stock Patterns, together with Approximate Weight and other data on application.

HUNT'S
EQUILIBRIUM DIRECT-MAIN GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight & Coke Co. (19), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Hales-owen, Leicester, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

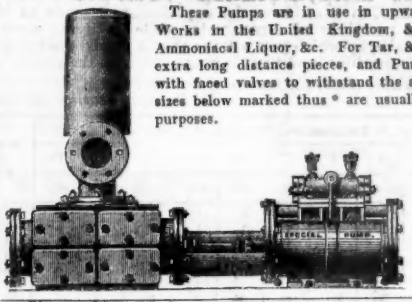
The Gaslight and Coke Company,
9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

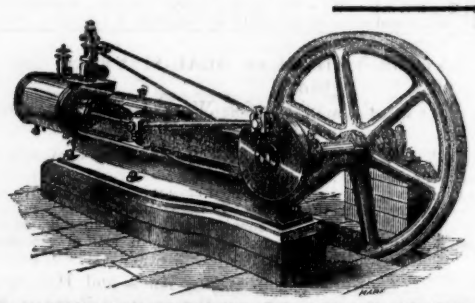
THE
"SPECIAL" DIRECT-ACTING STEAM-PUMP.



These Pumps are in use in upwards of one hundred Gas-Works in the United Kingdom, &c., pumping Water, Tar, Ammoniacal Liquor, &c. For Tar, &c., they are provided with extra long distance pieces, and Pumps are entirely of iron, with faced valves to withstand the action of the liquid. The sizes below marked thus * are usually kept in stock for these purposes.

The quantities delivered of Tar should be taken about two-thirds that of water.

Diameter of Steam Cylndr.	Diameter of Water Cylndr.	Length of Stroke.	Gals. of Water per Hour, Approx.	Prices for Water.	Prices for Tar and Ammoniacal Liqr.
*3 in.	1¼ in.	9 in.	450	£16 0 0	£17 0 0
*4 ,,	2 ,,	9 ,,	815	18 0 0	19 0 0
*5 ,,	2½ ,,	12 ,,	1,250	21 0 0	23 10 0
*5 ,,	3 ,,	12 ,,	1,830	22 10 0	24 0 0
*6 ,,	3 ,,	12 ,,	1,830	25 0 0	26 10 0
*6 ,,	4 ,,	12 ,,	3,250	30 0 0	31 10 0
6 ,,	5 ,,	12 ,,	5,070	35 0 0	36 10 0
*7 ,,	5 ,,	12 ,,	5,070	40 0 0	41 10 0
7 ,,	6 ,,	12 ,,	7,330	45 0 0	46 10 0
*8 ,,	6 ,,	12 ,,	7,330	50 0 0	52 0 0
10 ,,	6 ,,	12 ,,	7,330	60 0 0	62 10 0
10 ,,	8 ,,	12 ,,	13,000	75 0 0	77 10 0

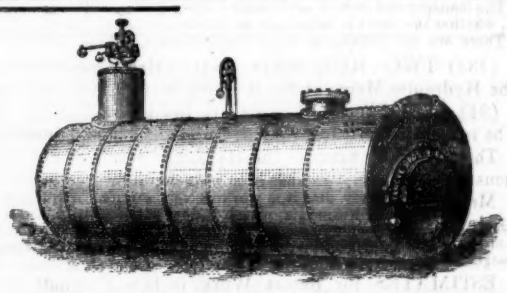


TANGYE'S HIGH-PRESSURE STEAM-ENGINE,
NEARLY 4000 IN USE.

The Design, Workmanship, and low prices of these Engines have called forth universal approval.

Nom. H.P.	2	3	4	6	8	10	12	14	20	25
	£28	£37	£44	£68	£86	£111	£122	£133	£185	£215

Including Governor and Feed Pump. Variable Expansion extra.



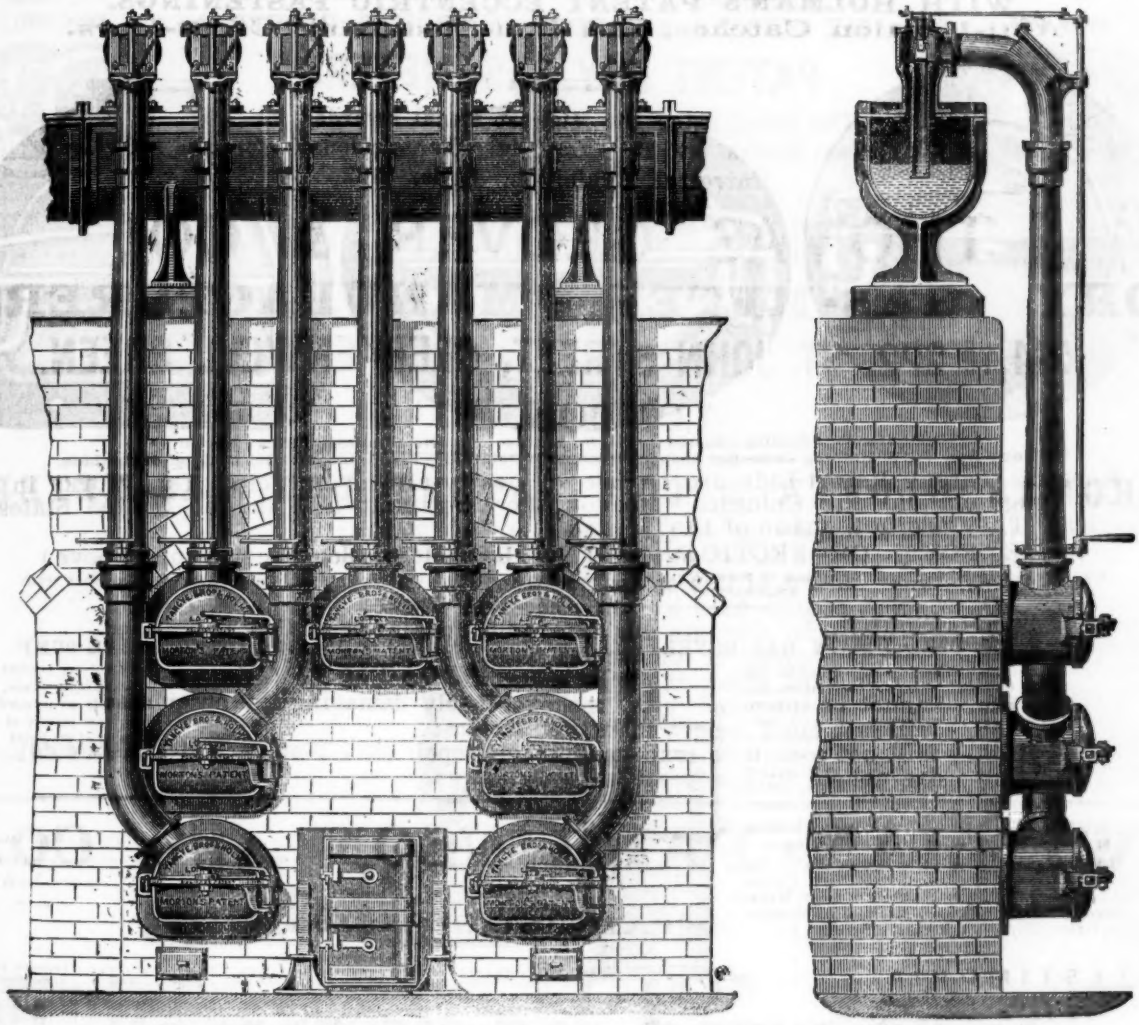
CORNISH, LANCASHIRE, "THE KESTERTON," VERTICAL, AND MULTITUBULAR STEAM-BOILERS OF SUPERIOR QUALITY ALWAYS IN STOCK.

This Department having been greatly extended and furnished with the most approved Boiler-making Machinery and Tools, T. B. & H. are prepared to supply all kinds of Steam-Boilers with great facility at lowest current prices.

Also Makers of IMPROVED HYDRAULIC HOISTS, TRAVELLERS, CRABS, CRANES, PULLEY BLOCKS, HYDRAULIC AND SCREW LIFTING JACKS, LATHES, PUNCHING AND SHEARING MACHINES, And all other Descriptions of Tools, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, &c., ON APPLICATION.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, because the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL-PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

Sole Makers:

TANGYE BROTHERS AND HOLMAN,
HYDRAULIC AND GAS ENGINEERS,
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

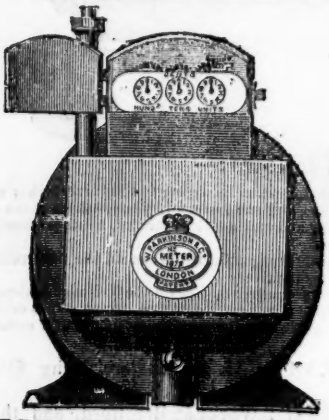
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

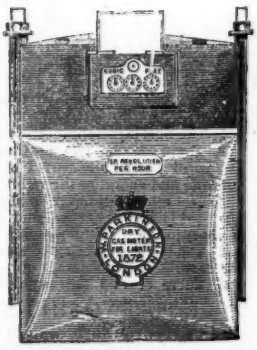
WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,



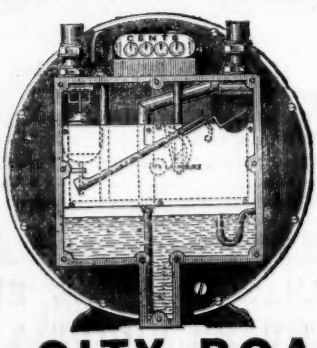
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 24, 1880.

Circular to Gas Companies.

The Bill in Parliament promoted this session by the Corporation of the City of London, which passes under the somewhat complex title of "The Gaslight and Coke, Commercial "Gas, and South Metropolitan Gaslight and Coke Companies "Bill," was read a second time last week, in spite of the mild opposition offered to it by Colonel Makins. We have already given an abstract of the measure in question, and are bound to say that the case made out by Colonel Makins was a lame one. Although provisions have been inserted, in recent Metropolitan Gas Acts, for testing the pressure of gas, they seem to have remained in abeyance, and it is only now that it is sought to bring them into active operation. We may say at once that these provisions must prove vexatious to the Companies concerned, and are likely to lead to some loss. The day pressure at six-tenths need not be objected to; but the pressure of one inch required from sunset to midnight, and which must be kept at some excess, may possibly increase the amount of unaccounted-for gas. Perhaps, too, it is hardly fair to saddle the Companies with the cost of the self-registering pressure-gauges that will be required. The tests are made in the interests of the consumers, and as a self-registering pressure-gauge is a somewhat expensive instrument, the cost might very well have been divided between the Corporation and the Companies. But as the latter have been required to furnish all other apparatus for the testing-stations, we suppose that this fresh imposition must not be objected to. We feel somewhat sorry for the Gas Examiners, whose duties will be considerably added to under the operation of such an Act as is now proposed. Their daily attendance at the several testing-stations will be requisite—not necessarily at any fixed hour, although it would be most convenient to change the registering papers daily at the same time. It will be seen, too, that the Examiners will have to diligently study an almanac, inasmuch as they will have to report on the maximum and minimum pressures between sunset and midnight and midnight and sunset. The duty that is proposed, requiring the pressures to be taken twice a week at the public lamps, is altogether new, and must cause some trouble. We therefore recommend the Examiners to ask at once for these additional duties to be considered in their salaries. In some respects the Bill as it lies before us is, as we have previously pointed out, favourable to the Chartered Company, inasmuch as it repeals the clause in the Act of 1876, which requires the Company to keep a register of the quantity of gas made at each of their stations, and fines them for deficiencies in illuminating power according to the amount of gas manufactured. Under the new Bill it is provided that a Company—say the Chartered—having a deficiency of illuminating power recorded at one station, shall only forfeit a specific sum, according to the amount of the deficit; and it is further provided that the same Company shall not be fined for defects at more than one station on one day. Considering how the gas from the several manufacturing stations of one Company is now mixed up, this is only a fair provision. The testings for purity are to remain as under the Acts of 1875-6, the average of three days being taken to represent the purity of one day.

Perhaps, however, it is superfluous to go on pointing out the provisions of this measure, as, from the opinion expressed by the Parliamentary Secretary of the Board of Trade, it seems clear that the Board will not allow the Bill to pass in its present form. It has been sent to the Metropolitan Gas Referees, with a request that they will give their opinion upon its provisions, and send a report, on receipt of which the Board will consider what shall be done. We can hardly too much admire the grandmotherly attentions of the Board of Trade to the interests of Gas Companies. The naughty boys of the controlling Authorities and the Companies might have had, in a committee-room of the House of Commons, a stand-up fight, which would have proved very expensive to all but the Metropolitan Board of Works, who, by obtaining a modification of the 21st section of the Bill, have left the Corporation to pay all expenses attending its promotion. The Board of Trade, however, propose to induce the parties to forego this fight, by calling them together to listen to a little lecture, and bidding them to shake hands and be friends. The proposal is that Companies and controlling Authorities shall consent to a measure to be called an "agreed Bill," which the Board of Trade promise to push through. Perhaps this will, after all, be the best course that could be pursued. If we might raise an objection, it would be that it virtually makes two of the Gas Referees the arbiters of the fate of the Gas Companies. There is no fear that the powers conferred on the Referees will be injudiciously exercised; but we must confess that we shall look with some curiosity for the report they may present on the Bill.

People have long complained of the lighting of Blackfriars Bridge, and their complaints have at last been brought to the notice of the Common Council. The Committee of the Bridge House Estates presented, at the meeting of the Council last Thursday, a report in which they proposed an alteration in the shape of the lamps, noticing the fact that the lamps at present in use are often broken, and more often extinguished especially in gusty weather. The lighting of the bridge, as a member remarked, has been a disgrace to the Corporation. Advocates of the electric light naturally proposed that this mode of illumination should be tried on the bridge, the power being obtained from the electric station of the Metropolitan Board of Works at Charing Cross railway bridge. We fancy that the suggestion may be carried out, notwithstanding the past experience of the Corporation with the light upon the Holborn Viaduct. We cannot agree, however, that the electric light is superior to gas in the case of a fog. A friend

of ours, who compared the penetrating power of the two lights during the recent dense fogs, gives it—and he is an unprejudiced judge of the matter—as his opinion that gas light has much greater advantages in a fog. However, we shall soon hear more of the matter, for the report has been referred back to the Committee for consideration.

It may here be mentioned that a new electric lamp, which promises some advantages over those at present in use, has been devised by M. André, and is now being exhibited in Liverpool. In this case, the carbon pencils are enclosed in a hermetically-sealed globe, as in the case of Mr. Edison's lamp. Of course, if the vacuum can be maintained, the carbon points will last a long time; but probably the inventor of the lamp will find the same difficulty as Mr. Edison has with his.

The Wharncliffe meeting of the Shareholders of the London Gaslight Company, called to approve of the promotion of the Company's Bill now before the House of Commons, was held last Wednesday. We need hardly say that the Proprietors gave their unanimous sanction to the steps taken by the Directors, and we do not anticipate that the Bill will have to encounter any opposition in either House of Parliament. The Bill when passed will undoubtedly conduce to the prosperity of the Company, but its provisions should be carried out in no niggardly spirit. The Company must have an abundance of apparatus to show, to let on hire, and to sell; the charges for hiring must be small, and the selling price, such as with reasonable interest will cover cost. It should be well understood that the profit is to be made by the increased sale of gas. This may be great or small, according to the liberality displayed by the Company in the disposal and hiring of the apparatus.

Alderman Chamberlain, M.P., occupied the time of the Birmingham Town Council, at their last meeting, by delivering speeches which occupy more than four columns of the JOURNAL, in moving the adoption of the report of the Gas Committee, to which we have alluded in a previous issue. Everybody knows that the purchase of the Birmingham Gas Companies undertakings has proved most advantageous to the Corporation, and every one also knows that the purchase was effected by the personal energy of Alderman Chamberlain. He might have been egotistical, but few expressions fell from his lips to remind the Council that the gas purchases were due to his foresight and judgment. It is not necessary again to mention the figures we have already given, but we may just state that Alderman Chamberlain speaks of a reduction of threepence per thousand feet having been made in four years, since the purchase of the undertakings by the Corporation. There is, however, no necessity to bestow praise upon a reduction which must have been made. The Corporation were, so to speak, gorged with profits, and there was no other course for them than to lower the price to the consumers. The fact is, that another reduction ought to be made about the present time, and this the Corporation can well afford if they will only give up their practice of applying profits in aid of rates. It may be said this is no business of ours; but the matter involves a principle. Alderman Chamberlain considers that as the ratepayers are responsible for the gas undertaking, they, *quoad* ratepayers, have the best right to the profits made. We, however, who do not consider that the ratepayers have any responsibility at all in the matter, think that the consumers should be first considered. Of course, seeing that the ratepayer and consumer are generally one, it follows that any benefit conferred by a low price for gas would be equally shared in. Alderman Chamberlain tells us, truly, that if twopence be taken off the price of gas for the benefit of the consumer, fivepence must be added to the improvement rate; and he sees very clearly that many consumers would pay the increased rate willingly if they could get a reduction in the price of gas. These would, of course, be the large consumers; but there must be in Birmingham a numerous class of persons occupying tenements of low rateable value, to whom low-priced gas would be a greater boon than a low improvement rate. But it is of no use to argue this question. A majority of the Birmingham Town Council have made up their minds that a large proportion of the gas profits shall be devoted to the improvement rate, while a very considerable balance is carried to the sinking-fund, which is calculated, at its present rate of increase, to pay off the purchase-money in twenty-eight years—a debt which Parliament has allowed them eighty years to wipe out. It is well, however, to make hay while the sun shines. The consumption of gas in Birmingham has relatively diminished, and the profits have, to a slight extent, decreased. There is also a prospect of their being smaller at no distant date, for coals are rapidly rising in price, and it is estimated that they will cost the Corporation £20,000 more for the current than for the past year. Much of this additional cost will, no doubt, be compensated for by the increased value of coke. The Corporation have suffered a good deal from the low price obtained for this residual during the past year or two; but everything now looks highly promising for the current year, and next February we shall probably hear of another £25,000 being carried to the improvement rate, and a still larger balance transferred to the sinking-fund. Alderman Chamberlain only expressed his disappointment at one matter. When studying the probable results of the purchase, he estimated that the consumption of gas would in four years increase twenty-six per cent.; whereas, as a matter of fact, the increase has only amounted to sixteen per cent. This is, so far, satisfactory; but the additional consumption would no doubt have been greater if the price had been lower.

The half-yearly meeting of the Liverpool United Gas Company was held on Tuesday last, when the maximum dividends were declared. The Company are in a very flourishing condition, and the Corporation seem to have ceased to indulge in dreams of buying up the undertaking. The consumption of gas increases very rapidly within the Company's limits, and it has become urgently necessary to make large additions to their Linacre works. We recently alluded to this fact when noticing the Bill promoted by the Company, and also referred to the circumstance that the Company proposed to raise some new capital by borrowing instead of by the issue of shares. After the ordinary meeting, a Wharncliffe meeting was held, to obtain the Shareholders sanction to the promotion of the Bill; and at this meeting it was announced that the Directors had resolved to strike out of the Bill all reference to the raising of fresh capital. They will thus only apply for powers to erect new works.

The annual meeting of the Newcastle and Gateshead Gas Company was held last Wednesday, when the usual dividend of 7 per cent. was declared, and a reduction of threepence per thousand feet in the price of gas was announced. This reduction, from 2s. 9d. to 2s. 6d. per thousand feet, with the usual discount of ten per cent., will practically bring the price to 2s. 3d. per thousand feet to ordinary consumers. The Chairman supposed this to be the lowest price charged for gas in any town in the United Kingdom. We may remind him that at Walsall the charge is 2s. 2d. per thousand feet; but this latter is a Corporation undertaking. The gas supplied to Newcastle and Gateshead is of excellent quality, and at the present price is remarkably cheap. What would the consumers of Birmingham say if the Corporation brought down their price to 2s. 3d. per thousand feet?

The annual meeting of the Ipswich Gaslight Company was held last week. The balance of revenue account admitted of the payment of maximum dividends—namely, ten per cent. upon the A shares and seven and a half per cent. upon the B and C shares—and to carry forward a balance of £268 to the next account. In past times great complaints were made both of the illuminating power and of the sulphur impurities in the gas furnished by the Company, and the Directors seem now to have set vigorously to work to prevent any such complaints occurring in the future. They have made extensive improvements in their retort-house, and are about to have erected new purifying plant of the most improved kind. For the time the Corporation and the Company appear to be at peace; but from what passed at the meeting it seems likely that the question of purchase may soon crop up again. The Company are about to issue new capital, which the Directors wished to put up to auction, but to this course the Shareholders objected, and it was eventually decided to allot the shares *pro ratâ* among existing Proprietors, and it was further decided to borrow an additional sum of £4700 on mortgage.

The Bury St. Edmund's Gas Company held their half-yearly meeting on the 13th inst. The Company have been so far successful under the sliding scale that they are able to pay an additional one per cent. dividend. This is something, but the Chairman does not hold out any hope of being able for the present to make another reduction in price, so there is no prospect of further increased dividends. Nothing unusual occurred at the meeting except a dispute as to the duties of a Company's Auditor. The Solicitor to the Company sent in a bill claiming a lump sum of £250 for his services in obtaining the Company's last Act of Parliament. The account stated shortly that the amount charged was for "innumerable attendances and correspondence relative to the "new Bill," and other duties in connection therewith; and, without specifying each item, really gave a summary of all the work done. The account had, of course, been passed by the Directors, and was placed before the Auditor with a receipt as usual. This officer objected that details should

have been furnished, which was perfectly unnecessary if the Directors had been satisfied with the reasonableness of the Solicitor's charge. We do not know that any other Company's Auditor would follow the same course, but we just mention it to express an opinion that the officer went rather beyond his duty.

Another pleasant gathering of gas managers, engineers, and others interested in the manufacture of gas, took place last Thursday, at the Jarrow works of the South Shields Gas Company, to view the new machinery invented by, and erected under the direction of Mr. W. J. Warner. Apart from the great interest which attaches to machinery in many respects so novel, and in all respects so useful, the gathering had a social aspect. After a luncheon had been discussed, Mr. Warner gave at some length a description of his apparatus, which had been seen in action by the assembled guests. It is not necessary here to enter into an account of the machinery, of which we shall presently give drawings and a full description. It is sufficient to say that the company which met on this occasion separated highly gratified with all they had seen and heard.

Under the auspices of Sir John Lubbock, an entirely new principle is about to be introduced into the management of joint-stock companies. Hitherto the paying off of capital has been strongly objected to; but by the present Bill, which has already passed the House of Commons, it is provided that when a Company have an accumulation of undivided profits, they may, under special resolution, return the whole or any part of it to the Shareholders in reduction of the paid-up capital. An option is given to the Shareholders to refuse the money which may be so offered to them, and to compel the Company to retain it, subject to interest of not less than three nor more than four per cent. The amount of capital so paid off, of course, reduces the paid-up capital by a similar amount; but the Directors will have power to increase the capital to the original amount. This may be a very wise piece of legislation; but its success will depend on one or two things. How are the Shareholders to be selected who are to be paid off? And what is to prevent the operation of this law, under the manipulation of clever Directors, being eventually to place the highest paid stock of the Company in very few hands? We are here thinking only of Gas and Water Companies entitled to divide ten per cent. It is, we believe, the consideration of a possibility of this kind that has hitherto induced the Legislature to refuse power to Companies to pay off share capital.

Water and Sanitary Notes.

Mr. Fawcett appears determined to hold the Home Secretary to his word. Last night he once more asked Mr. Cross what the intentions of the Government were with respect to the purchase and future management of the Metropolitan water undertakings. This question is beginning to create considerable excitement among the Metropolitan Vestries and District Boards, who, for the most part, are longing to have a share in the management, by the election on the proposed Water Trust of members from their several bodies. Of what that Trust will be composed we have as yet no information, for Mr. Cross, in his reply to Mr. Fawcett last night, said that the arrangements are not yet complete. Until they are, we shall not, of course, have any parliamentary action on the part of the Government. What Mr. Cross means by "arrangements" we do not understand. It is said that every settlement has been made with the Water Companies, so we cannot help thinking that the "arrangements" must relate to the constitution of the Trust. In reply to a further question from Mr. Fawcett, as to whether, considering the enormous pecuniary interests involved, and the risk of speculation in shares if some parties obtained earlier information than others as to the provisions of the proposed measure, the Home Secretary said he intended to ask the Chancellor of the Exchequer to give him a day for the introduction of the Bill, and he would take care that it should be in the hands of honourable members the following morning, or as early as possible. The latter part of his answer is somewhat Jesuitical. There can be no difficulty in getting the Bill printed so as to be delivered the morning after its introduction.

The annual report of Dr. Tidy to the Metropolitan Association of Medical Officers of Health, on the quantity and quality of the water supplied to London during 1879, has just been published; but, as we print regularly the Doctor's monthly reports, we need not here enter into many details. It goes without saying that the water supply of London is admirably maintained by the Companies. The quantity furnished now averages, we are told, 32·7 gallons daily per head of the population, which, within the limits of the Companies, now amounts to over four and a quarter millions. When it is remembered that provision for the supply of this vast population, which has never failed for a single day, with the exception of a few occasions in small isolated districts, has been provided and is maintained by private enterprise, it does seem most extraordinary that efforts should be made to abolish the Companies who have done so much for the Metropolis. Beyond the liberal supply given, we venture to assert that the general quality of the water is beyond all question. That it is occasionally turbid we do not deny; that it contains at times "organic carbon and nitrogen" is indisputable; and that even "living and moving organisms" may be occasionally found, by any one who will take sufficient trouble to discover them, we are ready to admit; but, taken on the whole, the supply of water obtained from the Thames and the Lea, and filtered by the Companies, is unquestionably equal in quality to any water supply in the kingdom. Dr. Tidy states very fairly that last year was an exceedingly trying one for the Thames Companies. The excessive rainfall caused frequent floods, and it need hardly be said that a heavy flood in the Valley of the Thames causes immense inconvenience to the Water Companies. These have been almost wholly obviated by the provision of subsiding reservoirs, which, holding sufficient water for several days consumption, relieve the filter-beds of a large portion of their work. The worst of it is that much of the good which is done by the Companies operations is undone by the filthy receptacles into which water is received on the consumers premises. We are not forgetful here of the condition of a cistern at a certain well-known club-house, at which great complaints were made of the water. Dr. Tidy concludes his report by the expression of a wish that when the water undertakings pass out of the hands of the Companies they may be as efficiently worked as they are now. We hope so too; but the works are not yet bought up.

The Water Bill of the Liverpool Corporation occupies a good deal of attention from the Corporations and others who derive their water supply either directly or indirectly from the Severn. It must be admitted that the opposition is not so active as it once threatened to be. Cheltenham, for example, not particularly interested in the matter, now declines to oppose. Bewdley, too, threatened opposition, but that has fallen through. The chief opposition now comes from the Severn Fishery Commissioners, who pretend to see in the execution of the designs of the Liverpool Corporation the abolition of all their rights, duties, and emoluments. They allege that the carrying out of the Vyrnwy scheme would rob the Severn of its best spawning-grounds, and would speedily lead to the extinction of all salmon in the stream. This would be a serious matter, seeing that, according to present appearances, in some of the Scottish rivers this fish is destined to destruction by disease. Severn salmon always had a high reputation, and we should greatly regret their extinction; but we really cannot place the worth of a few fish against the wants of an enormous community like that of Liverpool. We have before expressed an opinion that the principal opposition to the Bill would fall through, and the information which has reached us as to the proceedings of local bodies seems to support this conclusion.

It would appear that the Yeadon Water Company, against whom such strong complaints were made some time ago, are doing their best to remove all grounds of dissatisfaction. They have gone over their gathering-grounds, and have determined to stop out all sources of a polluted character. They are further about to bore into the new red sandstone, from which, of course, they can obtain any quantity of pure water. They further propose to construct a reservoir at a great elevation, from which the houses in the highest parts of Yeadon can be supplied. We never like to see a Company fail, so we hope the one at Yeadon will do their utmost to provide for the wants of the district they have undertaken to supply.

Yesterday's Prices of Gas and Water Shares.—Mr. A. G. Prater, Stock and Share Broker, of 23, Cornhill, gives the following as the closing prices yesterday of some of the principal gas and water shares:—

Gas Companies.		*Water Companies.*	
Commercial	181 —184	Chelsea	205 —208
Continental Union	19 — 20	East London	207 —210
Crystal Palace District	173 —177	Grand Junction	115 —117
European	17 — 18	Kent	284 —287
Gaslight and Coke "A"	183 —185	Lambeth	203 —206
Imperial Continental	177 —179	Southwark & Vauxhall	211 —213
London	175 —180	Do. "D"	172 —177
Phœnix	35½— 36½	West Middlesex	180 —183
South Metropolitan	195 —200		

URBAN WATER SUPPLY.

CONTINUING the analysis of the Parliamentary Return on this subject, we propose in the present article to consider the state of the supply to towns within the drainage area of the Trent. This great river, draining an important area in the middle of England north of that drained by the eastern tributaries of the Severn, has most of its sources in the coal measures; but the greater part of its course is in the Permian and Triassic beds, especially those known familiarly as the New Red Sandstone. Its northern tributaries and the upper part of the main stream flow in valleys over which there is a rainfall of about 29½ inches; but the southern feeders flow through a tract where the rainfall is only 26 inches. The population in the Upper Trent and the Valley of the Tame (which includes the western division of the whole area) is very large, amounting to at least two-thirds of that of the whole Trent catchment, although comprising much less than one-third of the whole number of square miles. Owing to the very favourable condition of the new red sandstone as a water-yielding formation, a large part of the supply of the district is obtained from wells in that rock, many of them sunk to great depth.

Very little information is to be found in the returns concerning the state of supply to these towns. Many of them are grouped, and are in the hands of large Companies having powers under special Acts of Parliament, and the Local Authorities appealed to for information do not seem to have thought it necessary even to inquire concerning the simplest facts connected with the supply. Of the numerous towns in the Staffordshire Potteries and the surrounding neighbourhood, from the sources of the Trent to Stafford, including the upper tributaries, no information whatever is given beyond the general statement that there is a constant supply from the deep wells of the Staffordshire Potteries Water-Works Company. The population thus supplied is not less than 160,000, and the number of towns is about fourteen. They include Stoke-upon-Trent, Newcastle-under-Lyme, Hanley, Longton and Lane End, Burslem, Tunstal, Kidsgrove, and several others of smaller population. We are not informed whether the quality of the water is good, the quantity sufficient, the works costly or otherwise, or the water charges reasonable.

Stone is the first town on the Trent not supplied by the Staffordshire Potteries Company. It has only private wells. Stafford, on the Sow, is also supplied by house wells, but the Corporation are undertaking works for a regular supply. Rugeley is similarly circumstanced, but arrangements are at the present time in progress with the South Staffordshire Water-Works Company. These towns bring us to the mouth of the Tame.

The Tame rises in the South Staffordshire coal-field near Wolverhampton, of which town about half the population is situated within the drainage area of the river. Its water supply has been already considered in the Severn catchment. The Wolverhampton supply extends more or less completely to six other large towns—namely, Bilston, Willenhall, Wednesfield, Heath Town, Short Heath, and Coseley. The last-named town is partly supplied by the South Staffordshire Water-Works Company. This Company are said to supply 24 gallons of water per head per day throughout the very large district they serve, which includes, besides part of Coseley, the towns of Walsall, West Bromwich, Tipton, Wednesbury, Darlaston, Rowley Regis, Oldbury, Smethwick, and Upper Sedgeley. The population supplied by the Wolverhampton works amounts to about 130,000, and by the South Staffordshire Water-Works Company about 250,000. All the information given as to the South Staffordshire Company is that the supply is constant. Birmingham has mixed sources of supply, the water being taken partly from the small river Rea, a tributary of the Tame, and partly from artesian wells. The proportions are not stated. All the water is filtered, and the supply is constant; it amounts to nearly 25 gallons per head per day. The cost of the works exceeds £4 per head of population, and the charge to consumers, as far as can be gathered from the returns, is as much as 8d. per thousand gallons. Birmingham also supplies, apparently on the same terms, Aston, Balsall Heath, Handsworth, Harborne, and Saltley. In the towns of Nuneaton, Bulkington, Hinckley, Chilvers Coton, and Tamworth, there are no public works, and the supply is chiefly from private wells. We need not enlarge here on the risk incurred in pumping up from the sandstone, even when the depth is considerable, water from beneath a large town, especially when it has existed as an inhabited place for many years. The town of Atherton is not in the return. Lichfield is supplied with well water pumped into a reservoir. There are two wells, one of which, sunk from the top of a hill, is old, the other is recent and in the valley. The depth is not great in either case. The supply is constant, and exceeds 35 gallons per head per day, but the waste is considerable. The cost of works for the new well and distribution has been about 35s. per head, and the charge is 3·8d. per thousand gallons. Ashby-de-la-Zouch receives an intermittent filtered supply from two streams, collected and pumped into a reservoir, but the quantity and cost are not given.

There are several towns in the sub-drainage area of the Dove, of which Leek is the principal. This town has a constant supply from springs flowing into a service reservoir, the amount obtainable being estimated at not much less than 30 gallons per head per day. This is not all used, and the surplus runs away to the River Churnet. The works cost at the rate of £2 6s. per head of population. The charge is 3·15d. per thousand gallons, not making any deduction for waste. At Ashbourne there are only local wells; and of Uttoxeter, Cheadle, and some smaller towns, there is no mention.

In the Derwent sub-drainage area we are told that Buxton has a constant supply from mountain springs to a sufficient but unmentioned extent. The works executed by the Local Authorities have cost as much as £8 per head of the resident population; but as the town depends on its visitors, which in the season quadruple the usual population, the amount is not excessive. The town of Fairfield has works in progress. Bakewell has a constant supply of 22 gallons per head per day from springs in the millstone grit. The cost of works was about £3 per head of population, and the charge about 7d. per thousand gallons. Baslow and Darley have no public works; the latter being supplied from springs. Matlock is supplied by a Company from springs, but there is no further information given. The same may be said of Matlock Bath. Wirksworth receives 20 gallons per head per day of water from the millstone grit. The cost of works is not given, and the charge as stated appears to be less than a halfpenny per thousand gallons. At Ripley, water-works are in progress. At Bonsall and Heage there are springs and wells, but no public works. Belper has a sufficient constant supply from a Company, but quantities are not given. Lastly, at Derby there is a constant supply to the extent of nearly 40 gallons per head per day, obtained from the river by filtration into adits driven at no great distance from the banks. No account is given of the charge, and the works are in the hands of the Corporation.

We now come to the sub-drainage area of the Soar, in which Leicester is the chief town, and Loughborough the next in importance. There are other towns, such as Barrow and Lutterworth, not mentioned; and Melton Mowbray, Thurmaston, and Quorndon are supplied from private wells. Leicester has a catchment area on Charnwood Forest, and large reservoirs. The water is exceptionally good, constant, and abundant, amounting to 30 gallons per head per day. The cost of the works a little exceeded £3 per head of population, and the charge is nearly 6d. per thousand gallons. Leicester supplies a part of Belgrave, but the quantity as stated is only at the rate of 2 gallons per head per day, and the charge as much as 2s. 8d. per thousand gallons. Loughborough has a constant supply of 26 gallons per head per day. The cost of works has been £2 5s. per head of population, and the charge is 2·2d. per thousand gallons.

Within the drainage of the Erewash, Heanor receives little more than 3 gallons per head, the water being raised from a shaft by pumping at a charge of 14·3d. per thousand gallons. Works are in progress which are expected to give an adequate supply at a moderate price. Ilkeston receives rather more than 8½ gallons per head per day, partly from a small catchment area, and partly from a deep well. The supply is constant, but insufficient. The works have recently been purchased by the Urban Authority, at a cost equivalent to 16s. 9d. per head of population, and the charge by the Company was at the rate of 7·4d. per thousand gallons. Additional works are required. The towns of Codner in the Erewash, Hucknell Torkard in the Lean, Bingham in the Devon, and Southwell in the Greet sub-drainage areas, are not alluded to.

In the Idle catchment are several towns, some of them populous and important, but concerning none of them do the returns give complete information. Except Warsop, where the River Meden is utilized, and Worksop, where works are in progress by a Company, the towns named are supplied by shallow wells and springs. At Mansfield, about 8 gallons per head per day are supplied from wells by a Company, and this is said to be sufficient. No particulars are given of cost or charge.

We have yet to consider the conditions of water supply in

the towns on the main stream of the Trent below the confluence of the Tame. The first town is Burton, which receives nearly 16 gallons per head per day from the South Staffordshire Water-Works Company. The next is Nottingham, which, till lately, was served by a Company, whose works have now been sold to the Corporation. The supply has been about 20 gallons per head per day, drawn chiefly from deep wells in the new red sandstone, some within the town, and others outside in the open country. The water from the town wells is inferior. No information is given as to cost or charge. Of Newark no information is given. Gainsborough is described as being supplied from the Trent with filtered water to the extent of 25 gallons per head per day. The supply is constant. The cost to the Local Board was about 27s. 6d. per head of the present population. The charge is 4·2d. per thousand gallons. Some additions to works are under consideration.

Such is the sum of the information communicated with reference to this great and important drainage area; but it is exceedingly meagre, omitting many large towns, and communicating no available information concerning most of the others. The result is that out of about 120 places, in each of which there is a population exceeding 1000, as many as 30 are not included, and must be assumed as being without Urban Sanitary Authorities; more than 20 are supplied by two large Companies, about whose arrangements no information is given; 12 by the two large Corporations of Birmingham and Wolverhampton, and 30 are supplied imperfectly by local wells within the town, and are without public works of any kind. Of less than one-fourth of the number are we enabled to give an account of quantity, cost, and charge, in any way complete. With regard to these, it is clear that the cost and charge vary exceedingly, being in some much less, but in general a good deal more than in the Thames and Severn towns.

The most important result of the inquiry with regard to these Midland and North Midland towns on the new red sandstone is, that so many of them obtain their water from wells, and that in so large a proportion the wells are private, and are therefore sunk within the limits of the town. There is no doubt that the large towns, and those places near the large towns, supplied by them are much better off than the smaller towns that are provided only with local wells. Thus Birmingham, Wolverhampton, Nottingham, Leicester, and Derby, the five largest towns, are well looked after, and really leave nothing to be desired in the way of water supply; but the same cannot be said of the towns of which the population varies from 2000 to 10,000. The returns, imperfect as they are, enable us to discover readily enough, by their silence, the places where sanitary conditions are least looked after, and therefore most required.

MR. ANDERSON'S NEW PAMPHLET.*

Mr. George Anderson is too well known among those to whom his new pamphlet appeals, to require either introduction or recommendation in these columns. His experience as a manufacturer of gas on a large scale, as well as a designer of works and an inventor of apparatus for every process involved in the production, purification, and distribution of gas, has always been freely expressed for the benefit of others, either at the meetings of the British Association of Gas Managers, or in his writings; and the pamphlet under notice may best be described as a confidential communication, to all whom it may concern, of certain facts and opinions which the writer has found useful in his own practice, and which may well be as important to others as he has found them to be in his own case.

Without pretending to be very comprehensive in its nature—a quality which is denied by the essentially personal character of the publication—it will be found to contain a good deal of information, and many valuable hints on practical details of gas management, which will be appreciated by those who do not use any of Mr. Anderson's specialities; while users of his improved appliances will be enabled to correct or verify their own experience of them by the reports from various sources which the pamphlet contains.

Mr. Anderson stoutly defends his system of combining clay and iron retorts in his so-called "triplicate" settings, and makes out a very good case for their general adoption. We own that the furnace gases leave an ordinary fire-clay retort setting with a great portion of their energy unused, which, in the usual way, is at once sent up the chimney and lost. Mr. Anderson maintains that this heat is quite sufficient to work iron retorts, and he contends that long experience of his combined settings bears him out in his belief.

Another portion of the pamphlet deals very fully with the revolving brush scrubbers which he has introduced with much success, and he explains their principle and action so clearly, and appeals so confidently to the records of their use in some of the largest gas-works of the United Kingdom, that we cannot do better than recommend gas managers who are meditating the extension or improvement of their washing and scrubbing appliances to make a careful perusal of his statements.

An account by Mr. R. H. Patterson of his systems of purification by dry lime, and of his "liquid processes," forms the concluding portion of the pamphlet. The former is well known and practised, but the latter have not as yet advanced beyond the experimental stage, although their inventor is sanguine of their ultimate adoption. His remarks, though somewhat combative in general tone, are well worth consideration, and certainly form by no means the least instructive portion of the publication; and as such we leave them to the critical judgment of our readers to whom any honest attempt to solve the great sulphur question is of genuine interest.

* "Improvements in Apparatus employed in the Manufacture of Gas." By George Anderson, Gas Engineer, London.

ANALYSES OF COALS AND CANNELS.*

We have before us a work containing the verified and averaged analyses of various kinds of English, Scotch, and Welsh gas coals and cannels, made from bulk by Mr. Robert I. Tootill, Gas Chemist, of Manchester, late Coal and Cannel Analyst and Assistant Chemist at the largest of the Manchester Corporation Gas-Works.

Strictly speaking, the experiments of Mr. Tootill might be more correctly termed practical tests, rather than the chemical operations generally described by the term analysis, being confined to the determination of the yield of gas, coke, tar, and liquor of the various samples, and the commercial value of these important components. The information thus obtained is, however, generally all that a gas manager requires to know, and in a brief introductory note the Author gives clear instructions as to the proper use of these data, in connection with the selling prices, for determining the true comparative value of one sample with another. Eighty-six examinations are given, the samples having been taken from bulk as delivered at the works, and the kinds of coal and cannel appear to represent fairly well the different sources from which the greater portion of the coal carbonized in northern and north midland gas-works is drawn, and some bear names equally well known farther south. There is only one important improvement we should have liked to see in the statements, and that is in respect of the coke, which is sometimes valued by Mr. Tootill in terms of comparison with the Wigan Coal and Iron Company's cannel coke, and in other cases is merely qualified as "good" or "bad." This strikes us as being rather vague and unsatisfactory. It would have been better if a fuller description of this important residual had been given; or, at least, the proportion of ash should have been recorded.

The book, nevertheless, will, we have no doubt, be useful for reference by users of the varieties of coal and cannel comprised in the analyses given.

* "Analyses of Coals and Cannels." By Robert I. Tootill, Manchester.

Communicated Article.

THE THEORY OF DISSOCIATION.

By Mr. H. B. Dixon, M.A.,
Millard Lecturer on Chemistry at Balliol and Trinity Colleges, Oxford.

II.

The phenomenon of partial decomposition of compound bodies at high temperatures into simpler constituents, which reunite on cooling to reproduce the original compound, established by St. Claire Deville in the case of certain compounds, and called by him dissociation, was applied by Canizzaro and Kopp to explain particular variations from the law which connects the molecular weight of a compound with its vapour density. According to Mons. Deville's experiments, the amount of decomposition increases with the temperature, so that for a particular compound there should exist a temperature at which decomposition should be complete. At and above this temperature the decomposed substance should occupy as many times its original volume as the number of simpler bodies it split up into. If the temperature of complete dissociation into two constituents were but a few degrees above the boiling point of any given compound, then its vapour density, as given by experiment, would not be the real density of the compound, but that of a mixture of the two constituents occupying double the normal volume. Dissociation gives an easy explanation of abnormal density, and reconciles apparent contradictions with the truth of Avogadro's hypothesis, that *equal volumes of all gases contain an equal number of molecules.* To understand the importance of this question on chemical science, it will be necessary to glance at the development of the molecular theory of gases from the beginning of this century.

According to the generally received atomic theory of Dalton, matter is not infinitely divisible, but is composed of a multitude of very small indivisible particles, or atoms, having peculiar properties and a definite mass. The ultimate particles or atoms of one kind of matter are all exactly similar, but differ in properties and mass from the ultimate particles of other kinds of matter. Thus hydrogen gas is supposed to be made of an aggregation of minute indivisible hydrogen atoms, chlorine gas of an aggregation of minute indivisible chlorine atoms, each of which are 35½ times as heavy as each hydrogen atom. When combination takes places between the two gases, each atom of hydrogen unites with one atom of chlorine to form a "molecule" of hydrogen chloride; so that, in the aggregate, one part by weight of hydrogen unites with 35½ parts by weight of chlorine to form 36½ parts by weight of hydrogen chloride. Since combination thus takes place atom with atom, the proportion by weight in

which two elementary substances combine will give the relative weight of their respective atoms. But many elementary substances combine together in more than one proportion to form different kinds of matter, in which cases the different combining proportions are found to bear very simple ratios one to another. Take the substances produced by the union of the elements oxygen and nitrogen in different proportions. If the compound with the least oxygen be analyzed, it is found to contain 14 parts by weight of nitrogen for every 8 parts by weight of oxygen; the next compound is found to contain 14 parts by weight of nitrogen for every 16 of oxygen; the next, 14 of nitrogen for 24 of oxygen; the next, 14 of nitrogen for 32 of oxygen; the last, 14 of nitrogen for 40 of oxygen. In this series of compounds the amount of oxygen which unites with the same weight of nitrogen increases by regular increments; so that the quantity of oxygen present in the second member of the series is exactly twice that present in the first, the quantity of oxygen in the third is exactly three times that present in the first, and so on. The study of this and similar cases of combination in multiple proportion led Dalton to enunciate his atomic theory. The reason of the *regular* increase in the weight of oxygen, as we pass from the lower to the higher oxides of nitrogen, lies in the fact that each atom of nitrogen can unite with one, two, or more atoms of oxygen, each weighing 8, and in no intermediate proportion. According to Dalton's theory, the lowest oxide contains only one atom of oxygen in its molecule; the second, two atoms; the last, five atoms. When an element is thus capable of combining in several proportions, the lowest proportion was that taken by Dalton as its "atomic weight."

It is usual to express the atomic weights of all the elements by the ratios which they bear to the weight of hydrogen. We assume the atom of hydrogen to weigh 1; this weight is taken as the unit of the atomic scale, and the weights of the other elements are referred to it. But we have as yet no means of deciding whether the combining proportion, as given by analysis, is really the atomic weight of a particular element, or some multiple of it. In other words, the exact determination of the percentage composition of a compound gives us several numbers, between which a choice must be made for the atomic weight of its constituents, according as we suppose one or more atom of each to be present. Dalton found that in the two compounds formed by carbon with oxygen, one contained exactly twice as much oxygen as the other, united to the same weight of carbon. In two compounds of carbon with hydrogen—namely, ethylene and marsh gas—the latter contained exactly twice as much hydrogen as did the former, combined with an equal weight of carbon. If the weight of hydrogen in ethylene be taken as unity, then the weight of carbon united with it is 6. In marsh gas, then, 2 units of hydrogen are united with 6 parts by weight of carbon. Moreover, in water there are 8 parts by weight of oxygen united with 1 of hydrogen; 6 and 8 being the weights of carbon and oxygen which can unite respectively with unit weight of hydrogen. These numbers express, therefore, the proportion by weight in which carbon and oxygen should unite to form the simplest compound, atom with atom, if ethylene and water are the simplest compounds of carbon and oxygen with hydrogen. Now, in carbonic oxide, 6 parts by weight of carbon unite with 8 parts by weight of oxygen; and, in carbonic acid, 6 parts by weight of carbon unite with twice 8, or 16 parts by weight of oxygen. Calling the atomic weight of hydrogen 1, the atomic weight of carbon was taken as 6, the atomic weight of oxygen 8. These numbers are not those generally accepted by chemists at the present day as the atomic weights of carbon and oxygen; for there are many facts tending to show that water is not the simplest compound of hydrogen and oxygen, and that ethylene is not the simplest compound of hydrogen and carbon. Of these facts, the most important are those connected with the volumes occupied by matter in the gaseous state.

In 1805, Gay-Lussac discovered, by exact experiments, that a given volume of oxygen unites with exactly twice its volume of hydrogen to form water. The simplicity of this ratio led him to examine the exact proportions by volume in which other gases unite. He established, by careful experiments, the fact that hydrogen and chlorine combine exactly, volume with volume, to form hydrochloric acid; that 2 volumes of nitrogen are united with exactly 1 volume of oxygen in nitrous oxide; and that 3 volumes of hydrogen are united with exactly 1 volume of nitrogen in ammonia. Moreover, he discovered the fact that the volume of a compound gas bears a similar simple ratio to the volume occupied by its constituent gases in the free state. Thus 1 litre of hydrogen unites with 1 litre of chlorine to form exactly 2 litres of hydrochloric acid gas. There is no contraction of the gases on combination. One litre of oxygen unites with 2 litres of hydrogen to form 2 litres of steam; 1 litre of nitrogen unites with 3 litres of hydrogen to form 2 litres of ammonia gas. The same simple relation between the volumes of the combining gases and the volume of the compound gas has been proved to exist in many other cases; in all the experiments the gaseous volumes being measured under the same conditions of temperature and pressure.

On applying Dalton's atomic theory to the chemical combination of gases, a remarkable relation is made manifest. According to the atomic theory, bodies unite in definite proportions by weight, which express the relative weights of their atoms. Gay-Lussac showed that gases unite in definite and simple proportions by volume. There exists, therefore, a simple ratio between the volumes of gases and the number of atoms contained in these volumes—in other words, there is a simple relation between the density of gases and their atomic weights.

What this simple relation is was first propounded by Avogadro. According to his hypothesis, all matter in the gaseous state consists of free and independent molecules, removed one from another by heat-repulsion to distances, great in proportion to their size, and always equal under like conditions of temperature and pressure. A litre of hydrogen and a litre of chlorine contain the same number of molecules. These molecules are so far apart one from the other that the force of cohesion does not come into play between them, and the distances between them are governed solely by the temperature and pressure to which the gases are subjected, independently of the chemical nature of the molecules themselves. The two gases, therefore, expand or contract equally for an equal increase or decrease of temperature, and expand or contract equally for an equal decrease or increase of pressure. The hypothesis of Avogadro is in accordance with all the observed physical properties of gases, and gives a very clear and simple explanation of the laws of combination of gases by volume; if it can be shown to be true, it affords a very certain method of determining, not only the atomic weights of the elements, but the molecular weights of compound bodies from which their atomic composition may be calculated. For if equal volumes of all substances in the gaseous state contain an equal number of molecules, then the relative weights of equal volumes of two gases will bear the same relation to one another as their molecular weights. Now the *density* of hydrogen gas is taken as 1, and the *molecular weight* of hydrogen is taken as 2, for reasons which we will examine directly; accordingly, the number expressing the density of any gas, compared with hydrogen as 1, will not express its molecular weight as compared with hydrogen, but *half its molecular weight*.

A litre of hydrogen, which we assume to weigh 1, combines with a litre of chlorine, which is $35\frac{1}{2}$ times as heavy. Two litres of hydrochloric acid gas are produced, which together weigh $36\frac{1}{2}$—the sum of the weights of the components. Each litre of hydrochloric acid weighs half this amount, or $18\frac{1}{4}$. But each litre of hydrochloric acid contains the same number of molecules as the original litre of hydrogen and as the original litre of chlorine, and each molecule of hydrochloric acid must contain *at least* one atom of hydrogen and one atom of chlorine; so that in the two litres of hydrochloric acid there must be at least twice as many atoms of hydrogen and chlorine as there were molecules of hydrogen and chlorine originally. Each molecule of hydrogen and chlorine must then, if Avogadro's hypothesis is correct, contain at least two atoms. Since hydrochloric acid is the simplest known compound of hydrogen and chlorine, its molecule is said to consist of one atom of hydrogen and one atom of chlorine, and the molecules of these gases in the free state are accordingly said to consist of two atoms.

It is a practical inconvenience that we have different standards for the density and molecular weight of bodies in the gaseous state; as the custom obtains, we have 1 for the unit of density, 2 for the unit of molecular weight. This mode of reference has led many chemists to adopt the expression that *the molecule of a compound gas occupies two volumes*. "Specific gravity," or "density," being defined as "the weight of a unit of volume," and the molecular weight of a compound body being double its density, this molecular weight is, therefore, the weight of two units of volume. The molecule of a gas is said to occupy twice the space occupied by one atom of hydrogen—a statement which, of course, implies that the molecule of hydrogen (H_2) occupies twice as much space as does the atom of hydrogen (H,) although, as far as we know, the atom of hydrogen (H) can have no independent existence apart from other atoms. In spite of this inconsistency, the statement that a particular molecule occupies two volumes has been found a concise way of expressing the fact that the vapour density of a particular substance is found to be half its molecular weight, the density of an equal volume of hydrogen, under similar conditions of temperature and pressure, being taken as unity.

That the elementary gases, oxygen, hydrogen, chlorine, &c., are composed of molecules, each containing two atoms at least—a consequence which follows from Avogadro's hypothesis—is not inconsistent with any chemical fact. Indeed, from purely chemical considerations, it seems probable that the molecules of these gases contain two atoms. With regard to gaseous compounds, we have a vast array of facts all pointing to the truth of the hypothesis. The densities of numerous compounds, as determined experimentally, are in accordance with what we know of their constitution as revealed by their chemical reactions. To take two instances, the vapour density of ammonia as compared with hydrogen is $8\frac{1}{2}$; its molecule, therefore, should weigh twice this amount, or 17. Chemical analysis tells us that the ratio of nitrogen to hydrogen is as 14 to 3, so that its formula must be either NH_3, or some multiple of this—*e.g.*, N_2H_6, or N_3H_9. But the hydrogen of ammonia is found to be replaceable by *thirds* only, not by *sixths* or by *ninths*. The formula NH_3 assigned to ammonia on purely chemical grounds, agrees with that deduced from its vapour density. The vapour density of ethyl alcohol is 23; its molecule should weigh, therefore, twice this amount, or 46. Chemical analysis gives for its formula either C_2H_6O, or $C_4H_{12}O_2$, &c. But the hydrogen of ethyl alcohol is only replaceable by *sixths;* the oxygen can only be taken out altogether or not at all. The first formula is, therefore, the correct one, which gives 46 for the weight of the molecule of alcohol, in accordance with Avogadro's hypothesis. From cumulative evidence such as this, the majority of chemists have been led to regard the hypothesis as the expression of a natural law, and, in cases where the chemical evidence available leaves it doubtful which of two or more numbers is the correct molecular weight of a compound, have appealed to the test of density as decisive. On such a foundation a great superstructure of chemical formulæ has been raised, so that the proof or disproof of Avogadro's hypothesis involves the security or fall of a great part of that which has been christened the "New Chemistry."

(To be continued.)

Parliamentary Intelligence.

PRIVATE BILLS RELATING TO GAS, WATER, Etc.

SESSION 1880.

PROGRESS MADE TO SATURDAY, FEB. 21.

Title of Bill.		Petition for Bill Presented.	Bill Read the First Time.	Bill Read a Second Time.
Ackworth, Featherstone, Purston, and Sharlston Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Birkenhead Borough Bill	Lords	..	..	..
	Commons	..	..	..
British Gaslight Company, Limited (Staffordshire Potteries), Bill	Lords	Feb. 10	Feb. 10	..
	Commons	..	..	..
Burton-upon-Trent Corporation Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Cardiff Water Bill	Lords	Feb. 10	Feb. 10	Feb. 20
	Commons	..	..	..
Chester Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Cork Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Cork Improvement Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Dagenham and District Farmers (Optional) Sewage Utilization Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 17
Dartford Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Dearne Valley Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Denton and Haughton Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Doncaster Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Eastbourne Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Edinburgh and District Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Exmouth and District Water Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 17
Great Yarmouth Water Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Hinkley Local Board Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Huddersfield Tramways and Improvement Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Hull Lighting Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Hyde Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
King's Lynn Corporation Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Lancashire County Justices Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Lancaster Corporation Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Lincoln Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Liverpool Corporation Water Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Liverpool United Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
London Gaslight Company Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Maidstone Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Malton Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Oldham Improvement Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Phœnix Gaslight and Coke Company Bill	Lords	..	..	..
	Commons	..	..	..
Portmadoc Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Prescot Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Preston Improvement Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Rathmines and Rathgar Township (Vartry Water Supply) Bill	Lords	Feb. 16	Feb. 16	..
	Commons	..	..	..
Rathmines and Rathgar Township Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Reading Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Rochester Corporation Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 16
Sea Water Supply to London Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Sligo Borough Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
South Metropolitan Gas Company Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Southwark and Vauxhall Water Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Stafford Borough Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Wakefield Corporation Water Bill	Lords	Feb. 10	Feb. 10	Feb. 16
	Commons	..	..	..
Wandsworth and Putney Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Wigan Improvement Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	Feb. 17
Wrexham Water Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..
Yeadon and Guiseley Gas Bill	Lords	..	..	..
	Commons	Feb. 9	Feb. 10	..

HOUSE OF LORDS.

THURSDAY, FEB. 19.

Petitions against the following Bills were presented:—

Rathmines and Rathgar Township Water Bill, from Dublin Tramways Company.

Wakefield Corporation Water Bill, from Corporation of Halifax.

FRIDAY, FEB. 20.

Petitions against the following Bills were presented:—

Sea Water Supply to London Bill, from (1) Conservators of the River Thames; (2) Lambeth Water-Works Company; (3) Fulham District Board of Works.

Sligo Borough Bill, from Roger Charles Parke.

Wakefield Corporation Water Bill, from (1) Henry Savile; (2) Owners, &c., of mills, &c. (W. H. Rawson and others); (3) Lancashire and Yorkshire Railway Company; (4) Calder and Hebble and Aire and Calder Navigation Companies.

HOUSE OF COMMONS.

MONDAY, FEB. 16.

Petitions against the following Bills were presented:—

Burton-upon-Trent Corporation Bill, from Sir Henry Flower Every, Bart., and the Rev. Rowland Mosley.

Dagenham and District Farmers (Optional) Sewage Utilization Bill, from James Stormonth Darling (as guardian of the estate of Peter Lauri Mackie, an infant).

Mr. FAWCETT again gave notice that he would ask the Secretary of State for the Home Department, on Monday, the 23rd inst., if he could inform the House when the Bill relating to the Water Supply of London will be introduced.

Mr. ROWLEY HILL deferred till yesterday his notice of motion, originally fixed for Tuesday last, the 17th inst., "To ask the President of the Local Government Board whether, in view of applications from various districts to take water for their own purposes from watersheds with which they have no natural connection, the Government are prepared, in anticipation of legislation upon the subject, to initiate an inquiry into the whole question of water supply."

TUESDAY, FEB. 17.

GASLIGHT AND COKE, COMMERCIAL GAS, AND SOUTH METROPOLITAN GASLIGHT AND COKE COMPANIES BILL.

Alderman COTTON: I beg leave to move that this Bill be read a second time. The objects of the Bill are to provide the means of ascertaining the pressure of gas supplied over any particular district, by self-registering pressure-gauges keeping a constant register at the testing-stations, and also by testings of the pressure at a certain number of the street-lamps, such number to be determined by the Metropolitan Gas Referees. It is likewise to provide means for obviating the present difficulty of ascertaining from which manufacturing station the gas is supplied to any particular place, and to render it possible by these means to assess the penalties, which, under existing circumstances, cannot be done, the gas from many manufacturing stations being mixed before it reaches the district where it is to be consumed. The honourable member the Chairman of the Metropolitan Board of Works is with us on this Bill. Originally, the Metropolitan Board opposed the Bill; but as they are now excluded from the 21st clause, they will not oppose the second reading.

Colonel MAKINS: I move that the Bill be read a second time this day six months. I am aware that the course I am asking the House to adopt—viz., to reject a private Bill on its second reading—is a somewhat unusual one. At the same time, where a Bill is exceptional in its character, and in all its principles and provisions is contrary to those recognized in the practice of the House, I think I shall have no difficulty in persuading the House that such a course ought to be taken. The Bill is promoted by the City of London Corporation, and its objects are to regulate the testing of the illuminating power, purity, and pressure of the gas supplied to the City—points which have all been already dealt with in the Acts of the various Gas Companies. Some of these Acts were passed so recently as 1875 and 1876; and the Corporation themselves, in a petition they presented last year with reference to a measure brought in by The Gaslight and Coke Company, and having, among other provisions, similar provisions to those contained in this Bill, stated that the regulations contained in the Act of 1876 had been most carefully considered, and were found to be most salutary in their operation, having tended greatly to improve the quality of the gas. This was said by the Corporation not later than last session; yet they now bring in a Bill to alter and amend those regulations. This is not all. The Bill, though promoted by the Corporation, deals with a large area outside their limits. We have heard the honourable member state that the Metropolitan Board are busy in promoting this measure. This, I need not say, is a recent conversion, and no doubt the honourable and gallant member for Truro will explain to us how it is that the Metropolitan Board of Works have changed their minds on the subject; for no later than the 6th of this month they passed a resolution that the Board should petition against the Bill. It may be that the Board of Works would be glad to have the Bill passed, if they could bring it forward without having to call on the ratepayers for the expenses; and knowing that the City has plenty of funds at its disposal, it may turn out that some such arrangement has been made by them. The Bill deals with three Companies, two of which supply gas outside the City. The third—The Gaslight and Coke Company—supply an area more than five times as great as that of the City. Therefore the controlling power of the City is small compared with the area over which the Bill seeks power to deal. My honourable friend (Lieut.-Col. Hogg) will perhaps explain how his opposition on that point has been done away with. There is only one other objection—but it is a rather strong one—which we urge against the Bill. In all former arrangements for testing the purity and illuminating power of gas, the penalties have been placed on the Companies only, so to speak, by consent. That is to say, when the Companies came to Parliament and asked for increased powers to raise capital, Parliament, in exchange for the powers they granted, required the Companies to submit, in the interest of the public, to certain restrictions. We have now a new way of dealing with

these matters; for the Corporation suddenly, and without any communication with us, launch upon us a Bill containing heavier penalties and more galling restrictions, and put upon us the expense of contending against this Bill in Committee. We have only one object, and that is to serve the public. We have no objection to such restrictions as Parliament may see fit to put upon us; but I think it would be perfectly possible for the Corporation and the Metropolitan Board of Works to arrange matters with the Gas Companies on terms which would be satisfactory to the public, the Board of Trade standing by and seeing that fair play is done. If such a course had been taken, our opposition would not have been necessary; but as the Bill has been introduced in a way which is an innovation on the usual practice, I must move that it be read a second time this day six months.

Sir J. M. Hogg: My honourable friend the member for South Essex has rather challenged me to make some explanations as to my course with reference to this Bill; and even if he had not done so, I should have felt it my duty, as Chairman of the Metropolitan Board of Works, representing many millions of the ratepayers of the Metropolis, to offer some observations upon the measure. On behalf of my colleagues at that Board, and on behalf of the ratepayers, I should have felt it to be my duty strongly to oppose the Bill, had it not been for the assurance of the member for the City of London that the Metropolitan Board would be excluded from the 21st clause. I may perhaps explain to the House that the Metropolitan Board, not having the power of interference, could have no control; and I need not say that my colleagues at the Metropolitan Board would decidedly object to paying money, over the expenditure of which they had no control. We had two or three meetings on the subject, and we were anxious to promote a friendly Amendment Bill. But our friends in the City wished to go farther than the Metropolitan Board. The Board only wanted to amend existing legislation. There are difficulties as to testing the gas supplied to various places, which it is impossible to carry out if there are defects in the law, and therefore the Metropolitan Board would have been glad to have had an amendment of the law. Their anxiety on the present occasion was to have a friendly amendment of the law, and not to have a costly contest with the Gas Companies. If my honourable friend will withdraw this clause, I, on the part of the Metropolitan Board, will not oppose the second reading of the Bill. But I reserve to myself and my colleagues the full power to go to the Committee and endeavour to amend the Bill, which, as it stands, the Board, on behalf of the ratepayers, cannot sanction. At the same time, I am one of those who think that when Bills are brought in here, those who advocate them should have a fair hearing, and that the Bills should have a second reading unless there are special reasons to the contrary. Therefore, on the part of my colleagues, I shall not oppose the second reading.

Mr. J. G. Talbot: I quite agree that it is undesirable to reject a Bill of this kind unless there is a strong *primâ facie* case against it, and I trust that the honourable member will not press his amendment to a division. This is a matter which the Board of Trade have not now for the first time in hand; they have been in communication with the various Gas Companies and the City of London and the Metropolitan Board of Works, and they have sent the Bill to the Gas Referees. I am quite willing to go so far with my honourable friend as to say that the Bill, as it stands, is one which the Board of Trade cannot support. But there is a case for legislation, and we propose, when the report of the Gas Referees is received, to bring the various parties together, and, if we can bring them into harmony, to have an agreed Bill. If we can have an agreed Bill, the Board of Trade will do its best to promote it; but if the different parties cannot agree, the Board of Trade will have nothing to do with it. The best course, in the interests of the public, will be for the Bill to be read a second time now, and the further stage postponed till the report of the Referees is received.

Colonel Makins: After the remarks of the Under-Secretary to the Board of Trade, I will withdraw my amendment.

The amendment was then formally withdrawn, and the Bill read a second time.

LIVERPOOL CORPORATION WATER BILL.

Sir Baldwyn Leighton gave notice that, after the second reading of this Bill, he will move—"That the Bill be referred to a Select Committee of nine members, five to be nominated by the House and four by the Committee of Selection, and that such of the petitioners as shall have presented petitions for or against the Bill may, if they think fit, be heard before such Committee by their counsel or agents. That it be an instruction to the said Committee on the Liverpool Corporation Water Bill that they have power to inquire and report upon the present sufficiency of the water supply of Liverpool and its neighbourhood (having regard to the powers obtained by the Manchester Corporation under the Thirlmere scheme); also of any other available source for such supply. To consider whether compulsory powers should be given to acquire the water of a separate watershed, such as that of the Severn, for the purpose; and, if so, how far, and under what conditions as to regulation of waterflow, compensation water with the necessary works, and adequate provisions to enforce such obligation. And to consider the prospective requirements and vested interests and rights of the populations situated in the Severn Valley and Severn Basin as to water supply, navigation, fishery, sanitary purposes, and the scouring effects of floods; also the water supply of populations situated between the Vyrnwy gathering-grounds and Liverpool; and to inquire whether any, and, if so, what provision should be made in limitation of proposals for the exclusive use of the water of the said gathering-grounds of the Vyrnwy river head."

Wednesday, Feb. 18.

Petitions against the following Bills were presented:—

Liverpool Corporation Water Bill, from (1) Captain Devereux Herbert Mytton; (2) Wallace James Arthur France; (3) Board of Conservators of the Severn Fishery District; (4) Cheshire Lines Committee; (5) Sheffield and Midland Railway Companies Committee.
Preston Improvement Bill, from Festwood Local Board.
Southwark and Vauxhall Water Bill, from West Middlesex Water Company.

Thursday, Feb. 19.

Petitions against the following Bills were presented:—

Ackworth, Featherstone, Purstone, and Sharlston Gas Bill, from George Bradley.
Hull Lighting Bill, from Sutton, Southcoates, and Drypool Gas Company.
Lancaster Corporation Bill, from Freemen of the Borough of Lancaster.
Liverpool Corporation Water Bill (the petitioners not praying to be heard), from Inhabitants of the parish of Llanwddyn.

Friday, Feb. 20.

Petitions against the following Bills were presented:—

Dagenham and District Farmers (Optional) Sewage Utilization Bill, from (1) Commissioners of Sewers for the Levels of Havering, Dagenham, &c.; (2) Conservators of the River Thames.
Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill, from (1) Gaslight and Coke Company; (2) South Metropolitan Gaslight and Coke Company.
Hinckley Local Board Bill, from Hinckley Gaslight and Coke Company.
Hull Lighting Bill, from (1) Kingston-upon-Hull Gaslight Company; (2) British Gas Company, Limited; (3) Dock Company at Kingston-upon-Hull.
King's Lynn Corporation Bill, from (1) Arthur Charles Greville and Edward Bailey (derivative trustees of Lady William Bentinck); (2) Norfolk Estuary Company.
Lancaster Corporation Bill, from (1) Robert Lawson and Josiah Ball (as trustees of the will of William Kelsall, deceased); (2) Midland Railway Company; (3) Anne Coulston and others; (4) Justices of the Peace for the County Palatine of Lancaster; (5) Lancaster Gas Company.
Liverpool Corporation Water Bill, from (1) Corporation of St. Helen's; (2) Severn Commissioners; (3) Staffordshire and Worcestershire Canal Navigation; (4) Mersey and Irwell Navigation and Bridgwater Navigation Companies; (5) Upper Mersey Navigation Commissioners; (6) Lord Harlech; (7) Sir Watkin Williams Wynn, M.P.; (8) Edward Williams; (9) Trustees of the River Weaver Navigation; (10) Lancashire and Yorkshire Railway Company.
Liverpool United Gas Bill, from Midland Railway Company.
Malton Gas Bill, from Malton Local Board.
Oldham Improvement Bill, from (1) Lancashire and Yorkshire Railway Company; (2) Chadderton Local Board.
Preston Improvement Bill, from (1) Preston Gas Company; (2) John Fletcher.
Rochester Corporation Bill, from Owners, &c., of lands, &c.
South Metropolitan Gas Company Bill, from (1) Vestry of Lambeth; (2) Vestry of St. Giles, Camberwell; (3) Helen Elizabeth Page Fryer and Sir Henry Page Turner Barron.
Southwark and Vauxhall Water Bill, from (1) Lambeth Water-Works Company; (2) Conservators of the River Thames; (3) Kent Water-Works Company.
Wigan Improvement Bill, from (1) Lancashire and Yorkshire Railway Company; (2) Baron Gerard.
Wrexham Water Bill, from (1) Great Western Railway Company; (2) Chester Water-Works Company; (3) Roger Assheton Rasbotham.

Saturday, Feb. 21.

Petitions against the following Bills were presented:—

Cork Gas Bill, from (1) Corporation of Cork; (2) Consumers of gas in Cork and its vicinity.
Dagenham and District Farmers (Optional) Sewage Utilization Bill, from (1) Metropolitan Board of Works; (2) Her Majesty's Commissioners of Sewers for Rainham, Mucking, and other Levels in the county of Essex; (3) The National Bank.
Denton and Haughton Gas Bill, from London and North-Western Railway Company.
Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill, from (1) Metropolitan Board of Works; (2) Commercial Gas Company.
Great Yarmouth Water Bill, from Sir Edmund Lacon, Bart., M.P.
Hinckley Local Board Gas Bill, from London and North-Western Railway Company.
Hull Lighting Bill, from North-Eastern Railway Company.
Hyde Gas Bill, from Hyde Local Board and consumers of gas.
Lancaster Corporation Bill, from London and North-Western Railway Company.
Liverpool Corporation Bill, from (1) Widnes Local Board; (2) Midland Railway Company; (3) London and North-Western Railway Company; (4) Corporation of Gloucester; (5) Corporation of Bootle-cum-Linacre; (6) Corporation of Warrington; (7) Merchants, manufacturers, and traders of Warrington; (8) Mining Association of Great Britain; (9) Earl of Haddington and others; (10) Shropshire Union Railways and Canal Company; (11) Corporations of Worcester, Shrewsbury, and Bridgnorth; (12) Great Western Railway Company; (13) Sharpness New Docks and Gloucester and Birmingham Navigation Company.
Liverpool United Gas Bill, from Corporation of Bootle-cum-Linacre.
London Gaslight Company Bill, from Metropolitan Board of Works.
Maidstone Gas Bill, from Corporation of Maidstone.
Malton Gas Bill, from North-Eastern Railway Company.
Oldham Improvement Bill, from (1) London and North-Western Railway Company; (2) Owners of property in Oldham; (3) Royton Local Board; (4) Crompton Local Board; (5) Failsworth Local Board.
Prescot Gas Bill, from (1) London and North-Western Railway Company; (2) Ratepayers, inhabitants, and consumers of gas.
South Metropolitan Gas Company Bill, from (1) Metropolitan Board of Works; (2) Joseph Francis Swann (against clauses only); (3) Owners, &c., of lands and dwelling-houses near proposed gas-works (James Barrett and others); (4) South-Eastern Railway Company.
Southwark and Vauxhall Water Bill, from (1) Metropolitan Board of Works; (2) Corporation of Kingston-upon-Thames; (3) Hugh Hammersley; (4) Hampton Wick Local Board; (5) Duke of Cambridge; (6) Wandsworth and Putney Gaslight and Coke Company; (7) Inhabitants of Seething Wells; (8) Chelsea Water-Works Company; (9) Lea Conservancy Board; (10) Grand Junction Water-Works Company; (11) London and South-Western Railway Company.
Wandsworth and Putney Gas Bill, from Metropolitan Board of Works.
Wigan Improvement Bill, from London and North-Western Railway Company.
Wrexham Water Bill, from (1) London and North-Western Railway Company; (2) Brymbo Water Company; (3) Ruabon Water Company; (4) C. F. O. Davis (for himself and Eliza Flint) and William Johnson.

A petition against the Liverpool Corporation Water Bill (the petitioners not praying to be heard) was presented from Corporation of Droitwich.

Suffocation by Gas at Liverpool.—On Saturday, the 14th inst., the Liverpool Borough Coroner held an inquest on the body of Isabella Atkinson, aged 22, of Adamthwaite Farm, Ravenstonedale, Westmoreland, who was found dead in bed on the previous morning at the Shaftesbury Temperance Hotel, Mount Pleasant, Liverpool, she having died, according to the opinion of Dr. John Bligh, from inhaling gas, the gas having been found fully turned on in her room, but not burning. Thomas Edwards, the "boots" at the hotel, testified to having found the deceased dead. The door of the room, witness stated, was not completely closed, it being open a few inches. Mr. John W. Lloyd, proprietor of the hotel, said the gas bracket was in good order. There was no chimney in the room, which was a small one. The deceased was in delicate health, and had come to Liverpool to consult a doctor. Dr. Bligh having stated that death was due to suffocation by gas, a verdict to that effect was returned. The jury expressed a regret that there was not some evidence to show how the gas came to be full on, but considered no blame to be attached to any one.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

THE GAS REFEREES SULPHUR TEST.

SIR,—The letter on the above subject which appeared in last week's JOURNAL, from the hero of more than 16,000 sulphur tests, requires a few comments.

I may state that I have had ten years experience in the use of the Referees and the Letheby tests, and am fully acquainted with the ordinary sources of error in both apparatuses; of the necessity for good ventilation, freedom from leaks, and proper combustion, in order to ensure accurate results; as well as of the influence of temperature on the quantity of liquor obtained. The source of error which I pointed out is, however, one that is exceedingly likely to pass undetected; in fact, my discovery was simply due to the accident of the proportion of liquor escaping down the trumpet tube, in the particular apparatus I was using, being sufficiently large to attract attention by its action on the ammonium carbonate. Had the error been smaller, it would probably have remained undiscovered, as I have no doubt a similar error has on more than one occasion during my long experience.

"Another F.C.S." speaks confidently of his *never* having had "such an accident." How can he tell positively that in some of his many experiments a small fraction of the liquor may not have escaped in the way I have pointed out?

I will not trespass further on your space at present, but will simply add that I did not intend my communication to convey the impression that the source of error alluded to existed to any large extent (although, for all we know to the contrary, it *might* do so), but simply to point out the possibility of its occurrence, as proved by what has recently come within my own experience.

H. LEICESTER GREVILLE.

Feb. 19, 1880.

Legal Intelligence.

INVERNESS JUSTICE OF THE PEACE COURT.

TUESDAY, FEB. 10.

(*Before Messrs.* FRASER *and* GRANT.)

ILLEGAL APPROPRIATION OF GAS.

Andrew Fullarton, baker, Baron Taylor's Lane, Inverness, was charged, at the instance of the Police Commissioners of Inverness, with contravention of the Gas-Works Clauses Act, 1847, the charge consisting of two counts. Under the first he was accused of having, on Aug. 1, 1879, in the shop or premises occupied by him, laid down, or caused to be laid down, a pipe communicating with the gas-main belonging to the Police Commissioners, who are the undertakers, under the Inverness Water and Gas Act, 1875, for supplying gas to the burgh of Inverness. It was alleged that by means of this pipe, and without the consent of the Commissioners, he had improperly used or burned the Commissioners gas, "without paying or intending to pay therefor." And it was further alleged that he allowed this pipe to remain in its position from Aug. 1, 1879, till Jan. 12, 1880—165 days. The second count was exactly similar in principle. The time, however, during which the pipe was said, under the second count, to have been used, was shorter—from Nov. 1, 1879, till Jan. 12, 1880—73 days. It was set forth in the indictment that the accused, by these actions, had rendered himself liable to a penalty of £5 for each of the two offences, as also to a penalty of 40s. for every day during which each of the pipes was so attached (238 days); also to payment of the expenses of conviction.

Mr. J. ANDERSON prosecuted; and Mr. D. J. MACKAY appeared for the defendant.

Mr. MACKAY said that on his advice Mr. Fullarton pleaded guilty to the first charge.

Mr. ANDERSON accepted the plea, and said that it was his intention, when moving for sentence, to restrict the number of days for which a penalty should be asked; but, before doing so, he desired to hear what Mr. Mackay might have to state on behalf of the accused.

Mr. MACKAY said whatever circumstances might have induced Fullarton to lay down a pipe in communication with the Commissioners gas-pipe, the fact undoubtedly remained that a direct offence had been committed. Pointing to the words in the indictment—"without paying or intending to pay" for the gas consumed—Mr. Mackay said that, had the case gone to proof, it would have been shown that there was no foundation for that statement. It was not the case that one of the pipes was laid down on Aug. 1, 1879; it was laid down on the 29th of August. And, as the accused had not obtained the consent of the Commissioners to lay down the pipe, it was not soldered in the usual way, but simply put in by way of experiment. The pipe was in the premises for some time before Fullarton became proprietor of the shop, and for a long while he did not know whether it was communicating with the meter or with the main; but, being very much inconvenienced, in carrying on his business, by the bad quality of the gas usually supplied, he (Fullarton) wished to see what benefit could be derived from using this hitherto unused pipe in the way indicated. Subsequently he found out that the pipe was really communicating with the main, without the gas passing through the meter. He (the accused) would also have been able to prove that shortly before the 29th of August, he gave orders for a gas-meter to be supplied for the pipe in question; but his instructions were not then attended to, and, accordingly, the gas continued to be burned without a meter for some time afterwards. It showed how innocent he was in the matter, that all his men were aware that the pipe was there; and they understood that arrangements had been made with the Gas Commissioners for having it used. The gas was not used continuously, but in connection with one operation only, and did not burn longer, on an average, than about three hours per week—one hour or so every alternate day. As he had already said, a meter had been ordered by Fullarton, and it was in consequence of delay in executing the order that gas was burned in the manner indicated.

Mr. FRASER: To whom was the order sent?

Mr. MACKAY said he understood that it was sent to the Gas Office; and he went on to remark that, besides those facts, he wished their honours to understand that the pipe in question was never joined to the main in the sense that a pipe was said to be joined. It was not soldered, but merely joined——

Mr. FRASER: It was so joined that gas could be taken off by it.

Mr. ANDERSON: Yes. That is the whole question.

Mr. MACKAY admitted this was so, and he further remarked that he should also have stated that the pipes were all old, and leaking in all parts of the house, which was an old building. In all the circumstances which he had mentioned, he submitted to their honours that they ought to restrict the penalties.

Mr. ANDERSON, as prosecutor, said that of all the statements laid before the Court there was not one that could be borne out by facts. If all these statements had been correct, on the part of Fullarton, the case should have gone to trial; and if it had he would have been able to satisfy the Court that the accused went deliberately about the matter—employing a plumber to connect the pipe, and actually giving him instructions that the gas-pipe should not go through the meter. With reference to the statement, that the gas so improperly used was burned only about three hours per week, he was in a position to say that it burned, on an average, four hours per day; and on the Saturday night it burned, from the moment it was put on, throughout the whole night, and was not extinguished till seven o'clock on the Sunday night, the object being not to give light to the premises, but really to keep up the heat which was absolutely necessary for baking purposes. Taking that into account, the manager of the gas-works said that the total consumption, under the first charge in the indictment, must have been equal to that of nine hours a day for 165 days. This involved a penalty of £335. If it was the wish of the Commissioners to ask for vindictive damages, the Court would have been bound to inflict that penalty, or send the accused to prison; but he (the prosecutor) was instructed to say that the Commissioners did not insist on a vindictive sentence. He, therefore, proposed to restrict the penalty. What they had charged the accused with was a very grave offence, and one which might have gone on for a long time without the possibility of detection. It was absolutely necessary to protect the Police Commissioners from such offences; also to protect the public, who complained of the high price of gas, it being impossible, if such frauds were allowed, that the price of gas could ever be reduced; and it was also necessary to protect the honest trader from the improper competition which might be carried on by those who committed offences of the kind in question. As he had said, he proposed to restrict the penalty; but in the interests of justice, and of all concerned, it was impossible to make it less than one of 40s. for each of 25 days of improper consumption of gas, together with £5 for the offence, and the expenses of the action.

Mr. FRASER said that a plea of guilty admitted the intention, and in view of that the explanation offered was a curious one.

Mr. MACKAY said he had advised Mr. Fullarton to plead guilty, because it was clear that an infringement of the Act had been committed. In the face of that fact, it would have been quite unnecessary to go into proof with the case. He had made a statement of extenuating circumstances, in order that their honours might see that there was no desire to defraud to the extent charged.

Mr. FRASER: Since you admit the intention to defraud, you admit the whole case. I think that by the restriction to 25 days, he gets off with a very lenient sentence.

Sentence was then formally passed. The accused was ordered to pay a fine of £5 for having committed the offence; to pay a penalty of 40s. for each of the 25 days to which the charge of having improperly consumed the gas was restricted—£50; and to pay the expenses of the action—£8 18s. 1d.—the total amount being £63 18s. 1d. Failing payment, he was to be imprisoned for three months.

LAMBETH POLICE COURT.—TUESDAY, FEB. 17.

(*Before Mr.* CHANCE.)

ILLEGAL USE OF GAS.

George Walter, described as a wine merchant, having offices in the City, appeared to a summons taken out by Mr. Alfred E. Allen on behalf of the Phœnix Gas Company, for having unlawfully caused to be altered the fittings of a pipe belonging to the Company without the consent of the Company.

Mr. BESLEY appeared to prosecute on behalf of the Company; and Mr. JOHNSON represented the defendant.

Henry Fells was the first witness called, and he stated that he went into possession of the house, in Hetherington Road, which defendant occupied as a furnished house. Witness was put in by the owner, as defendant had not paid any rent. On Nov. 29 the gas was disconnected from the meter by the Company, and on the same day witness, at the desire of defendant's wife, made a re-connection, and gas was burned. Witness some few days afterwards spoke to defendant, as he feared what had been done was not right; and defendant said, "You need have no doubt; I will be responsible." The gas was burned every night up to Dec. 31. On Jan. 1 it was cut off from the outside. Defendant slept in the house every night.

Mr. BESLEY hereupon asked for a penalty of £1 per day for the 30 days during which gas was burned.

Mr. JOHNSON having replied on behalf of defendant.

Mr. CHANCE said he was satisfied that defendant, notwithstanding the statement to the contrary, must have been fully aware of what had been done. Defendant throughout had acted very badly, and he therefore ordered him to pay a fine of £20.

WIGAN BOROUGH POLICE COURT.—MONDAY, FEB. 16.

(*Before Messrs.* W. ROOCROFT *and* R. THOMPSON.)

FRAUDULENT USE OF GAS.

Peter Lowe, Inspector of Nuisances to the Wigan Town Council, was charged with having fraudulently abstracted gas from the pipes belonging to the Corporation.

Mr. ACKERLEY appeared in support of the summons; and Mr. LEES for defendant.

Mr. ACKERLEY said that the proceedings were taken under the 38th section of the Gas-Works Clauses Act, 1871, which provided that every person who fraudulently abstracted, consumed, or used gas was liable to forfeit for every such offence a sum not exceeding £5, in addition to the value of the gas so abstracted.

John Edgar, a gas inspector in the employ of the Corporation, said that on Jan. 24 he visited defendant's house in Miry Lane, and examined the meter. He found it disconnected, the supply-pipe being connected with the delivery-pipe by a short piece of lead pipe resting on the top of the meter, the effect of which would be that the gas would pass into the house from the main, and be consumed without going through the meter, and without being registered.

Cross-examined by Mr. LEES, witness said that the meter was not connected at all. The lead pipe which had been introduced was 6 inches or 7 inches long. He did not see any lights burning. It was soon after eleven o'clock in the morning, and the gas was passing through it into the house. There was no abstraction of gas at that time, because there were no lights burning. He only saw Mrs. Lowe while at the house. When he spoke to Mrs. Lowe about the matter, she said, "Don't tell." The pipe was attached with either soap or tallow. When he visited the house on the following Monday, the pipes and meter had been set right. When he first saw the meter, the unions were unscrewed, and the gas was being conducted over the meter by the pipe he had mentioned, without entering it.

In reply to questions from the Bench, witness said he was positive of what he saw; but could not say how long the meter had been in the state in which he first saw it.

Mr. *J. G. Hawkins*, the Corporation Gas Engineer, stated that he super-

intended the laying down of the mains from Miry Lane to Corporation Yard about two years ago. There was a pipe connecting the defendant's house with that main.

Mr. LEES then addressed the Bench on behalf of the defendant, who, he said, denied that he knew anything of the circumstances stated by the first witness; but if such were the case he was not cognizant of it. It was unfortunate that the mouth of the defendant's wife was closed, for she appeared to be the only person who was able to give material evidence for the defence. Since, however, the summons had been served, the defendant had made inquiries, and found that his son and a friend, who had come from Liverpool, had been trying some scientific experiments, and, in doing so, had left the meter in the condition in which it was found by the inspector; but this was entirely unknown to the defendant or his wife. He (Mr. Lees) asked the Bench to consider the position in which they would place the defendant if they convicted him for another's acts, of which he was not cognizant. The defendant was an old man, and, if convicted, would probably lose his situation and his character. He (Mr. Lees) could merely ask the Bench to consider the circumstances very carefully, and to give the defendant the benefit of any doubt they might have.

Matthew Burton was called for the defence; but stated that, although he did make some experiments unknown to Mr. and Mrs. Lowe, he did not detach the meter. He merely inserted a short brass pipe in the supply-pipe an inch or two after it had left the meter, so that whatever gas he used would have been registered.

Mr. ACKERLEY hereupon pointed out that Burton knew nothing of the meter being detached and the lead pipe being introduced, and

Mr. LEES said he would not call the son, whose evidence would only corroborate that of Burton.

The Magistrates having consented to hear what Mr. Lowe himself had to say in reference to the matter,

Defendant denied that he knew the meter had been tampered with until told by his wife that somebody had interfered with it. He knew nothing at all about it. He had no connection with his son. About a couple of hours after the inspector had been at the house and complained of something being wrong, he went and looked at the meter, but found nothing out of place.

The MAYOR (who occupied a seat on the bench, but did not take part with the magistrates) offered to ask for a mitigation of penalty if defendant would plead guilty.

Defendant said he would not do this.

Mr. ROOCROFT said the Bench considered the case proved, and fined defendant the full penalty of £5 and costs, a warrant of distraint to be issued in case of non-payment.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

Lieut.-Col. Bolton, in his report to the Local Government Board, on the water supplied by the Metropolitan Water Companies during last month, says: "The state of the water in the Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated) was very turbid and bad from the 1st to the 8th of January, when it improved, and remained in a good condition until the 17th; it was then again bad for three days, but on the 21st it fined down, and continued in fair condition for the remainder of the month. The highest flood state of the river at West Molesey during the month was 2 ft. 4 in. above summer level, and the lowest 3 inches below the summer level, the rainfall being 0·59 inch. The water in the River Lea was generally good during the month. [These remarks refer to the condition of the water previous to filtration.] The water at all the intakes was generally in an indifferent condition during the month of January; the filtration was, however, efficient, the water supplied by the Metropolitan Water Companies having been clear, bright, and properly filtered.

The Registrar-General publishes the following table in reference to the water supply of London during January. According to the returns furnished to him by the Metropolitan Water Companies, 136,937,666 gallons, or 622,171 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily; or 237 gallons (107·7 decalitres), rather more than a *ton* by weight, to each house, and 33·4 gallons (15·2 decalitres) to each person, against 34·7 gallons during January, 1879.

COMPANIES.	Number of Houses, &c., supplied in Jan., 1879.	Number of Houses, &c., supplied in Jan., 1880.	Aver. Daily Supply of Water in Gallons* during Jan., 1879.	Aver. Daily Supply of Water in Gallons* during Jan., 1880.
Total supply	556,513	576,694	137,099,189	136,937,666
From Thames	262,632	275,469	66,385,239	67,813,589
,, Lea and other Sources	293,881	301,225	70,713,950	69,124,077
THAMES.				
Chelsea	29,562	29,945	7,642,200	7,888,000
West Middlesex	51,571	53,622	10,070,414	10,573,737
Southwark and Vauxhall	82,289	88,636	23,852,888	24,322,990
Grand Junction	38,989	40,285	11,400,537	11,729,662
Lambeth	60,221	62,981	13,419,200	13,299,200
LEA AND OTHER SOURCES.				
New River	127,867	129,683	27,474,000	27,186,000
East London	118,910	122,746	34,584,700	33,599,000
Kent	47,104	48,796	8,655,250	8,339,077

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for January, 1880, as compared with that for the corresponding month of 1879, shows an increase of 20,181 houses, and a decrease of 161,523 gallons of water supplied daily.

The following is Dr. Frankland's report on his analyses of the water supplied to London during January:—"Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies, and by the Tottenham Local Board, was—Kent, 1·6; Colne Valley, 1·6; Tottenham, 1·7; West Middlesex, 2·2; East London, 3·4; New River, 4·3; Chelsea, 4·7; Grand Junction, 4·9; Southwark, 5·2; Lambeth, 5·9. The Thames water supplied by the Chelsea, Southwark, Grand Junction, and Lambeth Companies was greatly inferior to that sent out by the same Companies in December. The West Middlesex Company, however, whilst taking water from the same source, reduced the proportion of organic impurity to less than one-half before distribution. All the Thames water was efficiently filtered, except that supplied by the Grand Junction Company, which was slighly turbid, and contained moving organisms. The Lea water, distributed by the East London Company, was of superior quality, but that sent out by the New River Company was only slightly better than Thames water. It was efficiently filtered by both Companies. The deep-well water supplied by the Kent and Colne Valley Companies, and by the Tottenham Local Board of Health, was of its usual excellent quality for dietetic purposes, and that sent out by the Colne Valley Company was suitable for all domestic purposes, having been softened before delivery. Seen through a stratum two feet deep, the waters presented the following appearances:—Kent, Colne Valley, and Tottenham, clear and colourless; West Middlesex, clear and nearly colourless; Chelsea and East London, clear and pale yellow; Southwark, Lambeth, and New River, clear and yellow; Grand Junction, slightly turbid and yellow."

Results of Analyses expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	33·16	·241	·037	·004	·244	·284	1·6	20·0
West Middlesex	32·06	·094	·038	0	·312	·350	1·5	29·0
Southwark	33·76	·277	·028	0	·255	·275	1·6	20·6
Grand Junction	31·46	·252	·040	0	·244	·284	1·6	19·7
Lambeth	35·12	·295	·055	0	·261	·316	1·6	21·2
Lea—								
New River	33·96	·217	·034	0	·277	·311	1·6	20·6
East London	38·74	·174	·029	0	·260	·289	1·8	23·0
Deep wells—Kent	43·40	·087	·013	·004	·352	·368	2·5	24·8
Outer Circle.								
Colne Valley	12·42	·083	·012	0	·347	·359	1·4	6·2
Tottenham Local Board	39·64	·091	·008	·004	·039	·123	2·9	20·8
Corporation of Birmingham*	25·58	·163	·022	·005	·363	·387	1·9	15·9
Corporation of Glasgow†	2·98	·146	·019	0	·007	·026	0·65	1·1

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of Anderson's College, Glasgow.

Errata.—In the tables of analyses for October, November, and December, the amount of ammonia in the Tottenham Local Board's water was erroneously printed as 0·72, 0·64, and 0·70 per 100,000 parts, instead of ·072, ·064, and ·070 respectively.

LONDON GASLIGHT COMPANY.

An Extraordinary General Meeting of this Company was held at the Offices, Southampton Street, Strand, on Wednesday last, "for the purpose of considering, and, if thought fit, approving of a Bill now pending in Parliament, intituled 'A Bill to confer further powers upon the London Gaslight Company, and for other purposes.'" MAJOR ROHDE HAWKINS, Esq., the Governor, was in the chair.

The SECRETARY (Mr. A. J. Dove) having read the notice convening the meeting,

The GOVERNOR said: We have asked you to come together to-day because most of you are aware that it is a regulation of the Legislature that directors of companies should not promote Bills in Parliament until they have consulted with, or laid the matter before the shareholders, explained what they proposed to do, and obtained their approval. On looking over our business, we thought there was room for increasing it in a legitimate way. Our Acts of Parliament, however, only gave us authority to make and sell gas for illuminating purposes; but you are aware that, as time has gone on, many other uses have been found for it, and especially for cooking purposes and for warming rooms; and whether gas is used for these purposes or for driving engines—that is, supplying engine power—there is a large field for its employment. Therefore we think it our duty to assist that as much as we possibly can; but as our Acts only authorize us to deal with gas as an illuminating agent, we wish to obtain increased powers, and therefore we propose to go to Parliament for authority to supply gas and other fittings, engines, and other apparatus. The Bill is a very short one, and you will see the pith of it in the second clause:—

> The Company may buy or hire and may supply, sell, or let to consumers of gas within their district or limits, for use upon premises belonging to or occupied by such consumers, burners, tubes, and stoves or ranges for heating or cooking by means of gas, and any other materials or fittings for the use of gas for domestic or other purposes, and also engines and machines for domestic, agricultural, manufacturing, industrial, or any other purposes whatever, to be worked by means of gas, for the production of motive power, and any materials or fittings to be used in connection therewith.

The next clause gives power for the recovery of charges in the usual terms; and then comes the fourth clause—power to take licences, &c.—which is as follows:—

> The Company may, subject to the provisions of this Act (but only for the purposes of the Company within the limits of their district, and not so as to acquire any exclusive right therein), contract for, take, and use any leave, licence, or authority to work, use, exercise, and put in practice any invention under letters patent heretofore made or hereafter to be made, granting any right or privilege of working, using, or vending any invention in relation to the manufacture, production, and distribution of light by means of gas, or the conversion, manufacture, or utilization of any products obtainable in or arising from such manufacture or production, or from the materials used therein, and for any such purpose as aforesaid may purchase, construct, maintain, and use all such apparatus and appliances connected with the manufacture of gas, and with the manufacture or distillation of the products and residuals arising from or out of the manufacture of gas, as they may require or deem necessary or expedient for efficiently and economically carrying on their undertaking.

Then, further, there is the protection of the Company's property. This is provided in the next clause:—

> In case any meters, service-pipes, fittings, engines, stoves, pipes, or other appliances, or any other property of the Company, are or is lent or let for hire to any person, the same shall not be subject to distress for rent of the premises where the same may be, nor to be taken in execution under any process of any court or any proceedings in bankruptcy against the person in whose possession the same may be.

Finally, there is the application of funds:—

> The Company may apply any funds belonging to them or under their control in payment of any expenses incurred by them in carrying into effect the provisions of this Act, &c.

That means that we may spend what capital we have in promoting this operation. The whole gist of the thing, however, is this—that we wish to have powers either to sell or let on hire these apparatuses, whatever they may be, other than illuminating apparatus; in fact, to increase the sale of our gas as much as possible for warming as well as illuminating purposes. We wish to have your sanction to our proceeding with the Bill we have promoted with this object. It is a very short one, involving little expense; but it is just as well we should have these powers, and then there will be no question of people using more gas than at present. I shall now move—"That the print of the Bill as introduced into the

House of Commons, now submitted to the Proprietors, is approved of by them."

Mr. NORTHOVER presumed it was the same Bill as that promoted by the Company last session.

The GOVERNOR: It is very much the same. It does differ slightly in this way: In our original draft last year we took powers to manufacture these apparatuses, but we have thought it better to omit that clause now. The Bill will be subject to any modifications Parliament may introduce.

Mr. NORTHOVER inquired whether there was any intention to ask for increased capital.

The GOVERNOR: No; we have plenty. We do not anticipate that this will be an expensive matter. We may spend £100, £200, or perhaps even £1000; but we shall not spend a shilling more than we can see profit for.

Mr. BENJAMIN seconded the motion.

The GOVERNOR: There is no amendment, so I will put the resolution for your approval, subject to any modifications, of course, which may be made or required by Parliament.

The motion was carried unanimously.

Mr. NORTHOVER supposed it would be somewhat irregular to ask any question outside the business on which they had been called together, otherwise he would have liked to ask if any progress had been made as to amalgamation.

The GOVERNOR: No; not in any way. I may answer that question candidly.

Mr. NORTHOVER said he was not at all an advocate for amalgamation unless they could do so on proper terms.

The proceedings then terminated.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday—Mr. D. O. BATESON presiding.

The SECRETARY (Mr. P. F. Garnett) read the Directors report, which was as follows:—

The Directors have caused to be prepared and submitted to them an estimate of the profits of the Company for the half year ended the 31st of December last, in accordance with the Company's Acts of Parliament, and, having duly considered the same, recommend the Proprietors to declare a dividend, for the half year ending as above stated, of £5 on every £100 ordinary consolidated stock, and at the rate of £3 10s. for every £100 upon the consolidated B (7 per cent.) stock, and on the capital paid up in respect of the new £7 10s. shares.

The consumption of gas has of late increased so rapidly as to necessitate an immediate arrangement for enlarging the Company's works at Linacre, and a Bill is now being promoted in Parliament for the purpose of authorizing the required additional works.

The Directors have to record, with deep regret, the death during the past half year of one of their colleagues, James Lister, Esq. The vacancy thus caused in the Board has been filled up by the appointment of Thomas Harrison, Esq., in Mr. Lister's place.

The CHAIRMAN, in moving the adoption of the report, said that the Company had, during the past six months, been going on in their usual course of unobtrusive usefulness. During this time nothing had occurred that he knew of which required any apology or explanation from him. They had been allowed to go on without the usual amount of adverse comment in the newspapers; whilst their arch-enemy, electricity, did not seem to have made very much progress—at all events, not such progress as to have done the Company great harm, if they might judge from the increasing requirements upon their supply. As the accounts were made up only in the autumn, no figures were presented at this meeting, but the Directors had satisfied themselves that they had quite sufficient at the credit of profit and loss account to be able to pay the dividends recommended in the report.

Mr. J. A. TINNE seconded the motion, which was carried unanimously; and the dividends recommended in the report were declared.

A Special General Meeting was then held, for the purpose of considering the Company's Bill in Parliament, entitled "A Bill to enable the Liverpool United Gaslight Company to erect additional gas-works, to extend their limits of supply, and to borrow further sums of money."

The SECRETARY explained that though the Bill, as presented to the meeting, contained clauses empowering the Company to borrow further sums of money, those clauses had, by a resolution of the Board of Directors, been ordered to be struck out of the Bill, and would not be presented before Parliament. He then read portions of the preamble and several of the clauses, showing that the object of the Bill was to extend the limits of the Company for the supply of gas so as to include the township of Orrell and Ford, in the parish of Sefton, and to enable the Company to enlarge their works at Linacre.

The CHAIRMAN said the Proprietors would pretty well understand what they were going to Parliament for. They owned 24 acres of land at Linacre, upon 10 of which they had powers to construct works, but the remaining 14 acres were purchased at a subsequent time, and upon them they had no power to build; and as the Legislature was very jealous about the erection of any works which could possibly be a nuisance, the Company were obliged to go for powers to build upon this land, because the 10 acres which adjoined were already almost entirely covered. Orrell and Ford formed a small district to the north-west of Walton, in which there was a large amount of building going on just now. The district dovetailed into the territory of the Company, and the plan now proposed straightened their boundary—in fact, gave them a more "scientific frontier." He went down to inspect the district with their Engineer (Mr. William King), and they found that they could light half-way down some streets, whilst the remaining half they were compelled to leave in Cimmerian darkness; and in one case they could light one of two houses under the same roof, but not the other. The proposed extension would cost very little; it would bring in a certain amount of revenue; and it would accommodate the inhabitants of the district. He moved—"That the Bill now submitted to the Proprietors, entitled 'A Bill to enable the Liverpool United Gaslight Company to erect additional works, to extend their limits of supply, and to borrow further sums of money,' be approved." The Proprietors, he said, would quite understand that the last sentence was withdrawn, and that they did not go for borrowing powers. The money clauses they would have to delay until a future occasion, and there was no doubt that it would not be long before they went to Parliament with a more comprehensive Bill. They expected, therefore, that the present Bill would be passed without opposition.

Mr. TINNE seconded the motion.

Mr. COPE asked if, in addition to studying the requirements of the out-townships, the Directors had ever turned their attention to the great good they might do by lighting up working men's homes in the parish of Liverpool. He was sure that no person could go round the town at night and look into the courts and alleys, and the homes of working men, without wishing there could be some mode of lighting up their dwellings at a small charge, without the costly meter and deposit system. He would suggest a monthly payment guaranteed by the landlord, and that the houses should be lighted, say, for four hours a night. The cost would be about 1s. 3d. a month, and he was sure that it would be a source of incalculable good for the health and welfare of the inhabitants. When they saw them sitting in their uncomfortable homes, lighted by a farthing candle, they could not wonder at the husband going away to the bright, well-lighted public-house, and he was rather astonished that it had not suggested itself to the Board to appoint a Committee to consider whether the consumption of gas could not be more extended amongst the poorer inhabitants.

The CHAIRMAN said their price for gas was fixed; and they could not make fish of one and flesh of another. They were not a philanthropic company. They were not intended to supply gas for the benefit of the public, but primarily for their own private interests.

Mr. COPE said he was aware they were not a philanthropic company, and he did not want them to supply gas for nothing, but he thought they might combine the two things—making money and philanthropy. He did not advise that the gas should be given away, but that it should be sold at the usual price, supplied for a certain number of hours, and then turned off by a tap.

The CHAIRMAN said he thought this was more a landlord's question. The Company were bound to sell the gas by meter.

Mr. COPE thought they might get a clause inserted in their Act of Parliament obviating this difficulty. He thought the time was coming when meters would be abandoned to a certain extent.

The CHAIRMAN said it was quite clear they could not insert such a clause in the present Bill, which had been deposited.

The SECRETARY said it would not be covered by the notices.

Mr. COPE asked whether, as he considered it a subject of vast importance, the Board would appoint a Committee to inquire into the matter.

Mr. GASKELL said he thought the matter was so much one of detail that, the suggestion having been made, they might safely leave it to the Directors.

The CHAIRMAN said the Board would remember what Mr. Cope had said, and would talk the matter over, and, if anything could be done which would not militate against the interests of the Company, they might consider it. In reply to a question, he said it was possible the Company would go to Parliament in a couple of years, but he believed that all the money there was uncalled up on the £7 10s. shares would be spent before they did so.

Sir THOMAS EARLE said he thought all the calls would be wanted for the works proposed in the Bill they were now going for.

The CHAIRMAN: We expect so.

The motion was then put and carried, and a vote of thanks to the Chairman, moved by Mr. DARBEE, seconded by Mr. GASKELL, terminated the proceedings.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual Meeting of this Company was held on Wednesday last—Alderman HEDLEY in the chair.

The SECRETARY (Mr. W. Hardie) read the following report of the Directors:—

In accordance with the Newcastle-upon-Tyne and Gateshead Gas Act, 1879, the Directors have called the Proprietors together at this time to receive the accounts for the half year ending Dec. 31, 1879, and to elect the Directors and Auditors for the ensuing year.

As announced in last year's report, the ordinary annual meetings will in future be held in February of each year, and the accounts will be made up for the previous year to Dec. 31, which will bring them into harmony with the Gas-Works Clauses Act, 1871.

Although no half-yearly accounts have hitherto been published, the Directors beg to state that those now submitted are of a favourable character. The receipts are £58,328 16s. 10d., and the expenditure £36,283 6s. 11d., leaving a balance to profit and loss account of £22,045 9s. 11d. After paying out of this sum £2347 13s. 8d. interest on debentures and other loans, there will remain, with the balance brought forward from last year, £34,035 0s. 6d., which the Directors propose should be appropriated as follows:—

Half year's dividend, at 3½ per cent	£15,750
To renewal-fund (making this fund £12,500)	2,500
Balance to next year	15,785
	£34,035

The Directors propose that, from the 1st of January of this year, the price of gas be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet, less 10 per cent. discount, which will make the net price 2s. 3d. per 1000 cubic feet—the lowest, they believe, that is charged in any other town in the kingdom.

During the past half year gas-pipes have been extended from Ryton to Prudhoe, and there have been laid altogether, in extensions and renewals, about 6 miles of pipes; 630 new branches have been laid, 713 old branches renewed, and 780 meters repaired, tested, and re-fixed.

In order to meet these and future extensions, the Directors, a short time before the late rise in iron, entered into contracts for all the wrought and cast ironwork necessary to complete No. 2 retort-house, at Redheugh.

The powers conferred upon the Company, by previous Acts for raising capital, having been exhausted, the Directors have summoned an extraordinary meeting of Proprietors, to be held at the termination of the ordinary meeting, at which resolutions will be proposed giving the Directors power to raise £50,000 of the additional capital authorized by the Act of last year, in such sums and at such times as they may deem advisable.

The Proprietors, at the present meeting, will have to elect Directors to hold office until next February, when three of them will retire by rotation, and so on every year afterwards. The Directors are Messrs. William Brown, Thomas Hedley, Benjamin Plummer, James Douglas, John Bennett Alexander, Thomas Lesslie Gregson, Ralph Atkinson, William B. Wilkinson, and Charles Henry Young. They retire, but offer themselves for re-election.

The Auditors, Mr. J. H. Richardson and Mr. R. Y. Green, also retire, but offer themselves for re-election.

In addition to these gentlemen, there is to be a Public Auditor of the accounts of the Company, being a competent public accountant, and the Directors have named for this office Mr. F. R. Goddard, of the firm of Messrs. Monkhouse, Goddard, and Co., but their nomination will have to be approved by the Corporations of Newcastle and Gateshead.

The CHAIRMAN moved the adoption of the report. After congratulating the Shareholders upon the very satisfactory condition in which the Company was, he said the balance-sheet showed that, after providing for a full dividend at the rate of 7 per cent., there was a balance of £15,785 to be carried forward, and this was in addition to £12,500 standing to the credit of the renewal-fund. In consequence of this balance the Directors had recommended that the price of gas be again reduced. Five years ago the price was reduced from 3s. 4d. to 3s. per 1000 feet, and in about two years the price was reduced to 2s. 9d., and now they proposed to reduce the price to 2s. 6d., with the usual discount of 10 per cent. to the ordinary consumers. This reduction ought, he considered, to be very satisfactory to the general consumers in the large district supplied by the Company. A reduction of 9d. per 1000 feet on the gas sold in the district amounted to about £30,000 a year. If nothing extraordinary occurred this year the Directors hoped to be able to pay the full dividend of 7 per cent., and also what their last Act of Parliament allowed them to do—pay 5s. more for each 1d. they reduced the price of gas. This would make the dividend 7¼ per cent. on the year if they could keep for the twelve months at the present low price. If, in consequence of the improvement now going on in the iron trade, coal advanced to higher prices, the Company had power to go back again to the price of 3s. 4d. per 1000 feet without reducing the dividend below 7 per cent. The balance of £15,000 carried forward, which was equal to a full half year's dividend, strengthened the Directors in their recommendation to reduce the price of gas, a low price of gas always increasing consumption. During the past year there had not been that great advance in the consumption of gas which there was in previous years; but they had held their own. Their works were still large and extensive enough to meet the heaviest demand in any week in the year. This heavy demand seldom continued more than two, three, or four weeks; but still they must have plant to meet the demands, or great complaints

would be made, and consequently there was a considerable standing expense always going on. They had been able to supply all the gas required, and could have supplied more, from their extensive works at Tedheugh. If any accident occurred at one of the works, the supply of gas could be kept up from their other works. The price of 2s. 3d. per 1000 feet now charged to ordinary consumers, and which meant considerably less to large consumers, was, he believed, the lowest-priced gas supplied to any town in the kingdom. One of the candidates for the office of Town Clerk told him that the Corporation of Blackburn purchased the gas-works a few years ago from the Company, and that the Corporation had been able to pay, out of the profits made, the full interest on the price given for the works, and had a balance left of about £3000. He inquired what the price of gas was at Blackburn, and the gentleman told him 4s. per 1000 feet without any discount to ordinary consumers, and 3s. 9d. to large consumers. If 9d. per 1000 feet made a difference of £30,000 a year to the consumers at Newcastle, 1s. 9d. would be equal to £60,000 or £70,000 a year; and the Company could supply the district at a much less price than if the Corporation had the works in their own hands. If the Corporation, however, felt inclined to give them a very handsome price for their works, he did not suppose the Proprietors would object to it, so that they might secure 7 to 10 per cent.; but he did not think there would be much chance of their doing that.

Mr. W. Brown seconded the motion.

Mr. Tweddle thought the price of gas should be reduced to 2s. 5d. per 1000 feet, in order that the Directors might have power to declare a dividend of 8 per cent.

The Chairman said that the discount of 10 per cent. off 2s. 6d. per 1000 feet brought the price down to 2s. 3d.; but if the price was 2s. 5d., the discount would be an odd sum, and not easily calculated.

The report was then adopted.

On the motion of the Chairman, seconded by Alderman Plummer, a dividend of 3½ per cent. was declared for the half year ended Dec. 31.

The Directors and Auditors were re-elected, and Mr. F. R. Goddard was appointed Public Auditor; and this concluded the business of the ordinary meeting.

A Special Meeting was then held, and resolutions were passed authorizing the issue of £50,000 of additional capital, to be sold by public auction in such manner and at such time as the Directors may determine.

Mr. Robinson proposed, and Mr. Douglas seconded, a vote of thanks to the Chairman, which was passed, and the meeting concluded.

RIO DE JANEIRO GAS COMPANY, LIMITED.

A Special General Meeting of this Company was held on Friday, the 13th inst., for the purpose of altering certain of the Articles of Association of the Company—Mr. Bartlett James in the chair.

The Secretary (Mr. T. Dawson) having read the notice convening the meeting,

The Chairman said they had met for the purpose of altering certain of the Company's Articles of Association, the working of which had been found most inconvenient—on some occasions almost impracticable. In case of illness—and this had occurred some days previously—they had found it difficult to get a sufficient number of Directors to sign cheques; and he had therefore to request the Solicitor, who was far more competent to deal with this matter than he (the Chairman) was, to read the proposed alterations, and to explain their relationship to the old ones.

The Solicitor (Mr. Clements) said the resolutions, which the Chairman would shortly move *en bloc*, were, first—"That the Articles of Association of the Company be and they are hereby altered as follows:—In Article 5, the words 'the Directors' shall be replaced by the words 'the Board, or some Committee or other person thereto empowered by the Board.'" He then read the original Articles, and said the effect of the change would be to give power to the Board, or any such persons as they might authorize, to sign cheques for petty cash and the payment of small accounts. In Article 9, it was proposed that the words "of two of the Directors" should be repealed, and replaced by the following words: "of any two Directors, or of any one Director and the Secretary or person appointed to temporarily perform the duties of the Secretary." This would give the power to two Directors, or to one Director and the Secretary, to sign cheques. Article 10 was repealed and replaced by the following:—"Article 10*a*. All payments of the Company in England, except on petty cash account, shall be made by cheques on the bankers (drawn in pursuance of some general or special resolution of the Board, or of a Committee thereto authorized by the Board), and signed either by two Directors, or by one Director and the Secretary or person appointed to temporarily perform the duties of the Secretary." That, in fact, was the substance of all the resolutions—viz., that one Director and the Secretary, or two Directors, should sign the cheques. Article 89 was repealed and replaced by the following:—"Article 89*a*. The quorum of the Board shall be such as shall be from time to time determined by the Board; and in default of and subject to such determination shall consist of two Directors." This was to provide against possible illness and absence on the Company's business. The Board were lately troubled by the illness of one of their colleagues, and the necessary absence of another on the business of the Company abroad, and they were obliged to make the Solicitor of the Company a member of the Board. This was a thing to be avoided by all possible means, and it was proposed to do so in this way:—In Article 101, section (O), the words "at least two Directors, and be countersigned or initialed by the Secretary," were repealed, and replaced by the following words: 'two Directors, or one Director and the Secretary or person appointed to temporarily perform the duties of the Secretary." At the end of section (EE) of Article 101 were added the words "or person appointed temporarily to perform the duties of Secretary." In some of the very largest companies the rule of two signatures was in force—viz., either two Directors, or one Director and the Secretary. It was found to work perfectly well.

The Chairman moved these resolutions *en bloc*.

Mr. Howard (a Director) seconded the motion.

Mr. Wordsworth said that, having a large interest in the Company, he wished to say a few words upon this question. First, as to the general tenor of these alterations, which were to convert this into a private firm rather than keep it as a public company. Now, of that he strongly disapproved. Of course, it was an exceptional case when their friend, Mr. James, had to go to Brazil. The Board then were weak, and the Solicitor had to be appointed a member, which was certainly not a proper course; as a paid officer of the Company ought not to be a Director. He was present at a meeting of the Company when a proposition was made that the remuneration of the Board should be increased from £1200 to £1500 a year, and he most cordially seconded that motion. When it was proposed, he believed there were six Directors; but at present, if he was correctly informed, there were only four. It was, therefore, almost impossible that they could form a quorum, and he wished to propose an amendment to the effect that the number of Directors should be increased. If the £1500 a year were divided amongst the four gentlemen appointed, they would each have £375 a year; and, for so large a remuneration, the Shareholders certainly had a right to expect the attendance of the Board. For this reason he most strongly objected to the proposition of the Chairman.

Mr. J. G. Weir thought that the alteration would put undue power into the hands of one Director and his nominee or the Secretary. It would be a very simple matter, if the design were conceived, for a very great fraud to be perpetrated upon the Company, and the proposed change was against business principles as ordinarily understood. He quite agreed with Mr. Wordsworth that the Board should be increased. If the gentlemen now on the Board had not sufficient time to attend to the Company's affairs, let them obtain those who had. Of course, there might be a considerable amount of trouble in Rio in connection with the Company's business; but why not elect two other Directors, and continue under the old articles?

Mr. Smith said the best remedy would be either to increase the Board or to reduce the amount paid to them. How many Directors could they appoint?

The Chairman: As many as eight.

Mr. Wordsworth: Is the Solicitor acting as a Director now?

Mr. Howard: Mr. Clements kindly consented to join the Board, at our request, on an emergency; but as soon as that emergency had passed away, and Mr. James had returned from Brazil, Mr. Clements resigned, and is again only the Company's Solicitor.

Mr. Smith said the explanation about the Solicitor only showed how desirable it was to strengthen the Board. He thought they should elect some competent gentleman with time at his disposal to join the directorate. The proposed alterations were, he considered, but a vote of censure upon the Board, for they were asking that one Director should do the work it was originally intended eight should perform, and he hoped the Shareholders would refuse to sanction these changes.

The Chairman said he was very sorry to find so much opposition to the proposed alterations. He would say a word or two in the first place in regard to Mr. Wordsworth's objections. He stated the Directors business was not the Company's business. He begged to differ from him, for he (the Chairman), in common with his colleagues, made it his business to look into all things. Mr. Howard was at the office every day, from the morning until late in the afternoon, looking after the Company's business, and he (the Chairman) went as often as he could. Having no other occupation of any importance at the present time, he gave nearly the whole of his time to the Company's affairs. The resolutions were simply brought forward with the view to meet an emergency. Only lately Mr. Henry was ill, and a third Director was not in a good state of health. These were circumstances that would constantly occur, and, personally, he did not see that any company could have a greater security than two signatures to a cheque. If the Shareholders thought they had not honest or capable men as Directors, let them turn out the present Board forthwith, and get a new one.

Mr. Wordsworth said that one of his objections to the change was that the Board were making the Secretary's position equal to that of a Director.

The Chairman said that of late there had been very delicate negotiations with the Brazilian Government. He was out in Brazil to carry them on and conclude them, and he had much difficulty in doing so, for he was detained there twelve months attending at the public offices. The contract signed ultimately was favourable to the Company, and included a clause to the effect that should the electric light be introduced the Company would have the first opportunity of applying it.

Mr. Smith congratulated the Chairman heartily on the sagacity he had shown in this matter.

The Solicitor said there could be no amendment to the resolutions, but those who disapproved of them could vote against them.

Mr. Smith: I do not object to the alterations; I simply wish to increase the Board.

The Chairman undertook at a later stage of the meeting to add two Directors to the present Board.

The Solicitor said he did not know any board who worked harder for a company than this one. Not a word could justly be said against the Board for inattention to the business. The present resolutions were intended not to shield them from work, but to meet an emergency, and if the Shareholders thought they were proposed with the first view, they were labouring under a great mistake.

The vote was then taken, when eight Shareholders were found in favour of the resolutions (including the Directors), and four against them.

The Solicitor said that as a three-fourths majority was necessary to carry the resolutions, they must proceed to a poll.

The poll was then taken, and at the close it was intimated that the shares represented personally in favour of the resolutions were 1108 and by proxy 5855, making a total of 6963; against the resolutions were 389 shares and no proxies. The resolutions were, therefore, declared carried, subject to confirmation at a subsequent meeting.

Mr. Smith proposed a vote of thanks to the Chairman for his services at this meeting, and for his able conduct of the negotiations abroad. He hoped the Chairman would be as successful in all he undertook for the Company as he had been in these negotiations.

Mr. Wordsworth seconded the resolution, and it was carried unanimously.

The Chairman briefly returned thanks, and the meeting separated.

IPSWICH GASLIGHT COMPANY.

The Annual General Meeting of this Company was held on Monday, the 16th inst.—Mr. S. A. Maw in the chair.

The minutes of the last meeting having been read and confirmed, the following report was presented:—

The Directors have pleasure in presenting to the Shareholders the audited statement of accounts for the year ending Dec. 31, 1879.

The profit and loss account shows a balance available for the payment of dividend amounting to £6104 2s. 3d. The Directors therefore recommend that a dividend of 10 per cent. per annum be paid upon the shares class A, and 7½ per cent. on shares classes B and C, and that the balance of £268 10s. 6d. be carried forward to the next account.

The Directors in their last report referred to the re-construction of the original retort-house, which has now been completed, and the retorts and fittings have been renewed, effecting such improvements as were possible. This has been carried out at considerable cost, which has added to the item for repairs and maintenance of works for the past year.

The erection of the new tank and gasholder, referred to in the last report, is nearly completed, and it is expected that it will be in operation in the course of two months.

The Directors report that they have under consideration the extension and improvement of the purifying plant, and arrangements are in course for the erection of two additional patent washers and two additional purifiers; also a new exhauster and town governor, the estimated cost of which is nearly £4000. In order to carry out these extensions, and meet other liabilities, it will be necessary to raise additional capital, and the Directors recommend that 600 new shares be created, and offered to the public by auction, and that a further sum of £4700 be borrowed upon mortgage.

The Directors report that the issue of coupons for interest on several existing mortgages will run out on the 31st of March next, and a majority of the bondholders have consented to accept a re-issue of coupons for a term of five years, at 4 in lieu of 4½ per cent. per annum.

The Directors cannot conclude their report without expressing their sincere regret

at the loss the Company have sustained by the death of their late Chairman, William Bunn, Esq., who for a period of 41 years had been a member of the Board, and for 13 years Chairman. Samuel Alexander Maw, Esq., has been elected Chairman, and Frederick Corder, Esq., as Director in his place.

[The capital of the Company consists of £71,987 10s. in £10 ordinary shares, £17,300 in mortgages and bonds, and a premium-fund account of £4736 12s. 9d., making a total of £94,024 2s. 9d. The expenditure on capital account to Dec. 31, 1878, was £74,981 10s. 7d.; additional to Dec. 31, 1879, £14,100 11s. 9d.—total, £89,082 9s. 4d.; leaving a balance to credit of capital account of £4941 13s. 5d. The reserve-fund, invested in Three per Cent. Consols, amounts to £3904 2s. 4d.]

Dr.—*Revenue Account, for the Year ended Dec.* 31, 1879.

To Manufacture of gas—						
Coals, including dues, carriage, unloading, and all expenses of depositing same on works . .	£10,547	5	0			
Purifying materials, oils, water, and sundries at works	475	16	3			
Salaries of Engineers, including Chief Engineer, Superintendents, and Officers at works . . .	840	15	6			
Wages and gratuities at works	1,723	17	7			
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	3,849	0	1			
				£17,436	14	5
Distribution of gas—						
Salaries of Inspectors and Clerks in Light Office.	£138	18	8			
Repair, maintenance, and renewal of mains and of service-pipes, including materials, laying and paving, and labour	219	17	11			
Repairing, renewing, and refixing meters . .	423	19	4			
				782	15	11
Public lamps—						
Lighting and repairing				560	16	7
Rents, rates, and taxes—						
Rates and taxes				984	8	5
Management—						
Directors allowances	£300	0	0			
Salaries of Secretary, Accountant, and Clerks, Office-Keepers, and Messengers	266	13	4			
Collectors salary.	150	0	0			
Stationery and printing	65	16	3			
General establishment charges and incidentals .	110	13	5			
Auditors	40	0	0			
				933	3	0
Law charges				12	5	1
Bad debts				283	4	2
Total expenditure				£20,993	7	7
Balance carried to profit and loss account				6,213	13	2
				£27,207	0	9

Cr.—*Revenue Account.*

By Sale of gas—						
Private light rental	£18,362	7	0			
Public lighting and under contracts	2,300	14	1			
				£20,663	1	1
Rental of meters				563	7	3
Residual products—						
Coke, less labour and cartage.	£4,236	1	4			
Breeze	160	10	6			
Tar	876	17	11			
Sulphate of ammonia	572	6	8			
				5,845	16	5
Rents				108	0	0
Gas-fittings				26	16	0
				£27,207	0	9

The Chairman, in moving the adoption of the report, said that the document fully explained why he was in his present position, the Company having, by a very melancholy circumstance, been deprived of the services of Mr. William Bunn. The Shareholders were aware that for some years past the Directors had been engaged in renovating and restoring the works. Several years ago a new retort-house was built, with coal stores adjoining, and a steam-lift and tramway in connection. After this a purifying-house was erected, with new purifiers; but these had since become inadequate to meet the demand made upon them, and a further enlargement of the purifying plant was absolutely necessary. The Directors had also fitted up apparatus for dealing with the ammoniacal liquor, and last year they commenced rebuilding the old retort-house, which had been furnished with the most approved appliances that modern engineering science could devise. In addition to this they had had an arduous and anxious undertaking in the erection of what might be termed a noble gasholder. While all this had been done, the manufacture of gas had been carried on to a greater extent than ever, the consumption having been very large during the past year. As far as possible, all demands had been met. The new gasholder, calculated to hold 700,000 cubic feet of gas, was now well-nigh completed, the tank was being filled with water, and the Directors hoped that this would be of very great advantage to them in enabling them to supply the wants of the consumers. All these works, however, locked up a great deal of capital, and the Shareholders would be asked to sanction the issue of the 600 still unallotted shares, and also the borrowing on mortgage of the balance of the sum authorized by their Act of Parliament. They had already contracted for additions to the purifying-houses, and when these were completed the Directors had confidence that they would be able to supply the large requirements of the town with as good and pure gas as could be made. Even then some further expenditure would be required for additions to the mains. In conclusion, he moved the adoption of the report, with the exception of the paragraph relating to the issue of fresh shares.

Mr. Houghton observed that he had seen not only the report of the Directors, but the detached reports, from time to time, of the Inspector, and while he found no fault with the Directors or Officers, he felt that, being a Company entrusted with the sole supply of an article of imperative necessity, there ought to be the best understanding between them and their customers. The repeated testing of the gas struck him as rather a painful and humiliating thing. It was important that the article they supplied should be both pure and cheap, and he felt that there was a possibility of hampering those who manufactured the gas by loading the concern with too much capital. Money could be borrowed outside at 4 per cent., yet they went on issuing shares to themselves at 7½ per cent. Let them borrow money in the cheapest market, and they might then manufacture a purer article at a cheaper rate.

Mr. Jeffries asked the quantity of gas they obtained from the 14,110 tons of coal carbonized during the year; what the coke realized, or, in other words, what was the amount of the deductions for labour and cartage; what sum had been expended for the freight of coals, and whether any contract was obtained, by tender or otherwise, for the conveyance of coal to Ipswich. He expressed great surprise that it should have cost £3981 1s. 8d. for management and labour—an amount which he considered excessive. For the residual products, also, he thought a fair price was not received in comparison with other places. At Birmingham gas was of better quality—averaging 17·27 candles, at a considerably less price; and the ammoniacal liquor there produced more than the tar, while the ammoniacal liquor and tar each produced nearly as much as the coke and breeze. Taking into account the amount of coal carbonized, he calculated that the residual products should have realized at least £4000 more than they did. He regretted having to complain of the Directors for supplying a bad article. The reply that they wanted more purifiers was, to his mind, most unsatisfactory. The Shareholders were told each year that the Directors were taking into consideration the extra demand, and were doing what they could to improve their position; but their position was not better, but worse.

The Secretary (Mr. E. Goddard), in reply to Mr. Jeffries, read the following clause in the Company's Act of Parliament, to show what was required of them:—

Unless prevented by frost, or other unforeseen or unavoidable cause, or accident, or during necessary repairs, all the gas supplied by the Company shall be of such quality as to produce from an Argand burner, having 15 holes and a 7-inch chimney, and consuming 5 cubic feet of gas per hour, a light equal in intensity to the light produced by 14 sperm candles, burning 120 grains an hour, and shall be so far pure from sulphuretted hydrogen as not to discolour moistened test-paper imbued with acetate or carbonate of lead, when this test-paper is exposed for one minute to a current of gas issuing under a pressure of 5-10ths of an inch of water.

There had not been a single instance during the year in which this had not been complied with, and the Inspector had never reported any sulphuretted hydrogen; but there were other sulphur compounds which it was difficult to eradicate. At the same time there were means of removing them, and these the Company were now adopting. During the past year one of Mr. Livesey's patent washers had been fixed, which it was thought would have been sufficient to remove the carbonic acid from the gas; but it had not done so. To get rid of the compounds complained of, the gas had to be exposed to sulphide of calcium; but owing to the great affinity which lime had for carbonic acid, it was absolutely necessary first to get rid of the carbonic acid. Then the lime would take up the sulphuretted hydrogen and the sulphur compounds. To effect this it would be necessary to alter the arrangement of the purifiers. A contract for the alteration had been entered into, and as soon as the Company could get a sufficient storeage for gas to enable them to cease making it for a day or so, the contract would be carried out. The difficulty at present was this: To adopt the course suggested would necessitate putting the town in darkness for, perhaps, a week. They were already doing everything in their power to rid the gas of sulphur compounds, and were successful to a large extent. He might say that their presence was only ascertained by very subtle analysis, and, although the Inspector had reported 70 grains of sulphur in 100 cubic feet, with the apparatus at the works they had never been able to discover more than 55 grains. While the requirements of the Act were already met, it was to the interest of the Company as well as the public to remove all the impurities, and this they were endeavouring to do. With regard to the residual products, they were entirely subject to the market price, and there might be a better market for certain articles at Birmingham than at Ipswich. They were obliged to make a market where they could to get rid of their surplus. He was unable at the moment to give the cost of cartage and horse keep separately; and with regard to Mr. Houghton's observation, the Act of Parliament prescribed what amount should be raised in shares and what by loan, and to raise the capital in any other way would be illegal. For the freight of coal they paid the current rate, averaging from 6s. to 6s. 6d. per ton—never more.

Mr. Jeffries said if the Company charged a lower price for coke large numbers of the working classes would buy. At Birmingham the works were besieged with applications for coke, which was sold at 10s. per ton.

Mr. T. C. Corbold said the Company must make sure of a sale, and to do so they must sell in large quantities. The Directors desire was to sell the coke at its value.

In answer to questions, Mr. Goddard observed that Birmingham was not only about eight times the size of Ipswich, but was surrounded by the coal pits, so that the cost of coal was much less.

Mr. Houghton, with reference to his former remarks, said if the Company were so fettered by Act of Parliament as to be compelled to raise money at 7½ per cent. instead of borrowing it at 4½, it was inevitable that the Municipal Authorities, who could borrow money at a low rate, would come in and take over the works. They could not go back to the past, but when the next offer was made he hoped the Directors would call a meeting of the Shareholders.

The motion for the adoption of the report was then put and carried, and the dividends recommended were declared.

The retiring Directors (Messrs. W. Alexander, W. B. Jackaman, and W. Turner) were severally re-elected, and Mr. S. A. Maw, jun., was re-appointed Auditor.

The meeting was then made special for the purpose of authorizing the raising of new capital.

The Directors proposed that the 600 shares should be offered to the public by auction, but it was resolved by a considerable majority that the shares should be distributed at the rate of one for every ten shares held by existing Shareholders.

The Chairman then moved, and Mr. R. M. Miller seconded, a motion for raising a further sum of £4700 upon mortgage, which was agreed to, and the meeting closed with a vote of thanks to the Chairman.

BURY ST. EDMUND'S GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, the 13th inst.—Mr. G. Thompson in the chair.

The Secretary (Mr. W. Salmon) read the notice convening the meeting, and the report of the Directors, which was as follows:—

The Directors heartily congratulate the Shareholders on the present position of their Company.

Under the new Act the Shareholders are entitled to, and will now be paid 1 per cent. additional dividend on the several shares held by them. The increase of dividend has been obtained by the reduction in the price of gas to the consumers. While, therefore, the steady and successful progress of the Company enables your Directors to recommend the increase of dividend, they can only do that by the reduction in the price of gas. Thus the benefit extends alike to all.

The total cost of the new Act has been £558 2s. 10d., which is much less than was expected, and if you add to that the cost of the sale and issue of the first £1000 worth of shares, it will be seen that the premium received on the sale of the shares has more than paid the whole cost of the Act, and the sale and issue above mentioned.

The £616 18s. 6d. received for the premiums will form a distinct account, and will be applicable only in the way directed by the new Act—namely, "in extending and improving the works of the Company."

Since the last meeting the Directors have thought it desirable to change the investment of the reserve-fund, and they have done so. They believe the present investments are safe ones, and will realize 5 per cent.

The Directors have recently purchased the property, late Peckham's, at a total cost of £373 9s. 10d. This property consists of a good house and a long strip of ground, adjoining to, and running the whole length of their works on the south. This purchase gives the opportunity of finding a residence on the works for a foreman, and also the ready and easy means of adding to the present yard and coal-shed when found necessary.

The repairs during the last half year form an unusually heavy item, which has arisen from charging revenue with its full share of the new works, substituted for old and smaller ones. This item in amount is not likely to be repeated.

The capital of the Company will in future be known as the 1849 capital, 10 per cent.; 1859 do., 7½ per cent.; 1879 do., 7 per cent.

The Directors sincerely regret the cause of the late vacancy in the direction, which, under the powers of the Act of Parliament, they have filled up by the appointment of Mr. James Hoy.

At the meeting, two of the Directors—namely, Mr. Thomas Ridley and Mr. James Hoy—retire by rotation, but are eligible for re-election.

Mr. A. J. Hooper, one of the Auditors of the Company, retires by rotation, but is eligible for re-election.

Mr. James Hoy having resigned his appointment of Auditor, it will be necessary for the Shareholders to appoint an Auditor in his place at the meeting.

The Directors will recommend the payment of a dividend for the past half year of 11s. per share on the 1849 capital, and 8s. 6d. per share on the 1859 capital.

The CHAIRMAN, in moving the adoption of the report, said it would only be necessary for him to make a few observations, the report having gone so fully into detail. The Shareholders would observe that it had been rather an exceptional year with regard to expenditure. They had increased the capacity of the works by adding a scrubber, a governor, and other appliances, which, with new materials, had cost about £4000. All these works had been done under the discreet management of their Engineer, Mr. John M'Crae, and the Directors believed and hoped it would be for the permanent benefit of the Company. The Company's expenses had increased, but the Shareholders would see that the revenue had been charged with what was fair and proper. They might congratulate themselves upon the possession of their new Act, and they would observe that somewhat singularly the premium on the first issue of shares had paid every expense connected with obtaining it, and left a surplus of 13s. 4d. He very much feared that they would not be able this year again to lower the price of gas; they must, therefore, reserve any further reduction till some future time. They had been very fortunate in their contracts. Their coals were all paid for, and the contract renewed satisfactorily. The same might be said of the contracts for their tar and ammoniacal liquor. The reduction made in the price of gas had tended, as was to be expected, to increase the consumption, but it produced a smaller return. He hoped, however, after a few months, they might again realize the amount they formerly had. He had much satisfaction in saying that on the 31st of December the bad and doubtful debts did not amount to more than £12. For this they had to thank their excellent Manager and their active Collector, of whom they could hardly speak too highly. He assured the Shareholders of the continued anxiety of the Directors for the welfare of the Company, and said the report was not only satisfactory to them, but he had no doubt would be equally so to all who had to receive the dividends.

Mr. SMITHYES said he observed that an alteration had been made in the investment of the reserve-fund. He did not think the Directors ought to look out for high interest, and he believed the Shareholders would be more satisfied if the reserve were in the Funds. The average price of the Colonial stock purchased by the Directors was 111¼, which only gave 5 per cent. The Funds stood at 97, carrying interest on 100.

The CHAIRMAN said the Directors had very carefully considered the matter, and the Indian stock, in which their reserve-fund was invested, being about to be paid off, they thought it desirable to look out for some equally good investment.

The SECRETARY said if the money had been invested in the Funds it would have added but little to the dividends. When the Directors had the money to dispose of, the English Funds were very high, and he did not think any prudent man would have bought in stock at 98¾, which was the price of the Funds at the present time. The Directors had studied safety in the investment of the Company's money. The object of their new Act was to make them as economical as possible, in order that they might reduce the price of gas as fast as they could, and so increase the dividends. As to the question of safety, there was no doubt.

Mr. BURROUGHS seconded the motion.

Mr. HOOPER said before the motion was put to the meeting there was one remark he should like to make as a Shareholder. In his capacity as one of the Auditors, he had observed an irregularity in the account sent in by Messrs. Salmon and Son. Their Parliamentary Agent had been paid £250 for services in connection with the new Act, and he sent in an account, giving all details and items; but when he (Mr. Hooper) came to the account of Messrs. Salmon and Son, it was simply stated that it was for "innumerable attendances in securing the Gas Act." He said at the time that this was not a fair way of presenting an account, and he should not pass it. He did not understand the phrase "innumerable attendances," and to him it was not satisfactory. Expenses out of pocket were put down, and that was the only item that was given. He felt this was so irregular that he ought to bring it before the Shareholders. He had been told by one of the Directors that an Auditor had no right to criticize the accounts, but simply to pass them. To that he demurred altogether. It seemed to him that his duty as Auditor was to go carefully through the accounts, and to say in his judgment whether they were right or wrong. He did not know how the Shareholders would get to know anything of any impropriety in the expenditure if the Auditor confined himself to the mere schoolboy work of seeing that the receipts on one side and the payments on the other were correctly set down. It seemed to him that the Auditor should be allowed to use his judgment as to whether the accounts paid were fair. He did not say the account in question was not fair, but he objected to the way in which it was presented.

Mr. HOY said, as one of the Auditors, he could not endorse a word of what Mr. Hooper had said about Messrs. Salmon's account. The Auditors knew nothing about lawyers bills, even if they were made out in full; and, moreover, he thought it was not their province as Auditors to make any comments upon the accounts.

The CHAIRMAN said the amount of the bill was much within what the Directors expected, and many persons now sent in accounts without specifying the various items. He considered it would be presumptuous in them to ask Mr. Salmon to put down every visit he received from him (the Chairman) or others connected with the Company. They thought the bill very reasonable, and, under the circumstances, they did not consider it advisable to put Mr. Salmon to the trouble of sending in an account in detail. He had written to Mr. Walmisley, the Parliamentary Agent, stating that one of the Auditors had objected to Mr. Salmon's account because items were not given, and requesting that gentleman's opinion upon the subject. In his reply, Mr. Walmisley said he considered it an act of presumption on the part of an Auditor to interfere between the Directors and their Solicitor, and the Auditor had no right to call for a detailed account. He was quite satisfied that if Mr. Salmon had made a detailed account there would have been no difficulty in increasing the amount charged. He concurred with the Directors that the amount was most fair and reasonable. He (the Chairman) was very sorry these remarks had been made, and he hoped the Shareholders would consider the Board had acted properly.

Mr. SALMON said he had been the servant of the Company for 30 years, and this was the first time he had had a personal attack made upon him. He had worked through every detail of the Company's three Acts of Parliament, and the last Act of all, which he considered was worth £10,000 to the Company, was the crowning benefit to which he had been able to lend his assistance. They realized a few days previously, at a public sale, the increased value of their property; and now received the increased dividends. The Board had passed his account, and it was one he (Mr. Salmon) conscientiously believed to be within the mark. Of that they had the best evidence from the Parliamentary Agent. He could easily have increased the amount of his bill if he had put in the details; but he believed that the Shareholders had enough faith in him not to suppose he would send in an unfair account, and that they also felt some gratitude to him for his services to the Company. This was the only thing that had occurred in the course of 30 years to mar the harmony of the Company, and it was a deliberate attack upon the Directors as well as himself. It was said they ought to have everything clear and above-board. If the Shareholders did not think this was the case in the Company, let them clear the whole Board away. Under their new Act every pound they could save was of importance, both to themselves and the public, because it helped them to reduce the price of gas and at the same time increase their dividends. They were now benefiting the consumers as well as themselves without the sacrifice of a single principle. Their property was in the most perfect order, and fitted to do the work required of it. Their capital was secure, and they would be able to go on for the rest of their lives in unbroken prosperity. The only thing that could mar it was the introduction of dissensions in the management of the Company; they were unnecessary, and if permitted to continue, he would not give much for the prospects of their property. He had had most delicate work to do, during the past year, in order that the Company's Bill might be passed in the form and shape in which it was. And as to the short way in which his account had been stated, it was not merely, as Mr. Hooper said, for "innumerable attendances." In addition to "innumerable attendances," it gave, in one item of a good many lines, a summary of all that had been done.

Mr. SMITHYES did not think Mr. Hooper intended to suggest that there had been any overcharge.

Mr. HOOPER: No.

Mr. SMITHYES: And no doubt he wished to avoid establishing a precedent which others might use as a reason for not sending in bills in detail. As Auditor, it was his duty to analyze the accounts. If this was not the case, an Auditor was no check at all—he would not have a right to make any remark, but simply certify that the accounts were correct.

Mr. HOOPER said the expression he objected to was "innumerable attendances," and he thought the Shareholders would coincide with him that it was not quite the way in which bills should be sent in to them. If it became the fashion to send in accounts in lump sums, of course they must submit to it; but he did not think they ought to submit to such a precedent on the part of a legal gentleman. He repudiated any personal feeling in this matter, and said he admired Mr. Salmon's zeal and energy, and was pained to have to bring the subject before the meeting; but felt it to be his duty, as an Auditor, to do so. As to introducing dissension, in his opinion the way to maintain union and co-operation was to have everything above-board. If there was any suspicion on the part of the Shareholders that anything was not quite right, let them have the matter thoroughly ventilated, and more union and concord would result. He had no personal feeling against the Directors. He was as thankful to them as any man could be for the time and attention they gave to carrying on the Company's business, and he should be sorry to introduce any matter of discord; but to prevent this they must prevent the cause. If their Manager (Mr. M'Crae) were to send in a bill for "a great quantity of coal," he should refuse to sanction it.

Mr. SALMON said Mr. Hooper might object to the action of the Directors, but as an Auditor it was not his business to consider whether an account was right or wrong. That was the business of the Directors. If they thought fit to pay an account, the Auditor's duty was to see that a proper receipt was given for it.

Mr. J. C. BROWN regretted very much that anything should have been said in any way calculated to prejudice the Company. He thought Mr. Hooper had a little exceeded his duty. He did not think there was any reasonable ground for attacking their worthy Secretary, who had done so much for the Company; and from what he (Mr. Brown) gathered, his claim on this occasion was no more than might reasonably have been expected.

The CHAIRMAN pointed out that the expense of obtaining the last Act was more than £100 less than was expended in connection with the previous one.

The motion for the adoption of the report was then put, and carried unanimously.

The retiring Directors (Mr. T. Ridley and Mr. Hoy) were re-elected; and Mr. Hooper was re-appointed an Auditor, while Mr. J. R. Thompson was chosen as his colleague in place of Mr. Hoy, who had become a member of the Board of Directors.

The customary votes of thanks were then unanimously accorded to the Engineer and Manager (Mr. John M'Crae), whose skilful discharge of his duty was warmly eulogized by the Chairman; to the Chairman and Directors, the Secretary, and the Auditors, and suitably acknowledged, and the proceedings terminated.

THE SUPPLY OF WATER TO A PRISON.—A somewhat similar case to that recently noticed in the JOURNAL as to the water supply of Liskeard Workhouse was set down for hearing in the Court of Session on Saturday, the 7th inst. It was the case of *The Prison Commissioners of Scotland v. The Glasgow Water-Works Commissioners;* which was an action of declarator at the instance of the Prison Commissioners of Scotland against the Glasgow Water-Works Commissioners, in which the pursuers sought to have it declared that they were entitled to a supply of water for the Prison of Glasgow at the ordinary domestic rates, and that they should not be charged for water by meter. After certain procedure the case was taken out of court under an arrangement between the parties.

THE SEWAGE DIFFICULTY AT KIDDERMINSTER.—There are indications that the Kidderminster Corporation will soon have to face some serious difficulties connected with their extensive sewage farm near Stourport. When the sewerage and water-works schemes were carried out in the Carpet Metropolis seven years ago, at an outlay of about £110,000, it was arranged to dispose of the sewage by pouring it upon a vast tract of what was then almost barren land lying between Kidderminster and Stourport. The sewage was first received into a large tank in the town, and from thence pumped on to the land. One portion of the original scheme has been abandoned, owing to the continual difficulties which arose, and the tanks being abandoned, the sewage is pumped direct from the mains to the farm. Another difficulty of a more serious nature has now arisen. The soil, from being sterile, has become most fruitful, and the farm is unable to absorb the enormous quantity of sewage which is daily poured on it, and rumours are current that several injunctions are threatened against the Corporation, to restrain them from pumping the sewage on to the land. The Town Authorities are considerably exercised as to the best means of dealing with the matter. It has been suggested that a large slice of poor land in the immediate vicinity should be purchased and added to the farm; but no doubt professional assistance will be solicited before any final steps are taken. Already the sewerage scheme has proved a most expensive one, but it is evident that the ratepayers will have to be taxed still further.—*Wolverhampton Chronicle.*

TOWN AND COUNTY OF POOLE GAS AND COKE COMPANY, LIMITED.

The Eighth Half-Yearly General Meeting of this Company was held on Monday, the 9th inst.—Mr. W. Pearce in the chair.

The Secretary (Mr. J. Budden) read the notice convening the meeting, and the following report was presented:—

The Directors have to report that during the last half year they have raised a further sum of £500 by debenture bonds, which will complete the £2000 authorized to be borrowed by the special resolution of the Company passed on Aug. 12, 1878.

During the same period they have erected a large new coal store, sufficient to provide for the Company's operations for some time to come (the old store having for a long time past been wholly insufficient for the Company's purpose), and they have now to construct a building for housing stores of various kinds, and also a new office and board-room; the present office, which is also used as a board-room, being not only insufficient, but unhealthy, from being occasionally flooded at high tides. The Directors, therefore, propose to erect a new office and board-room and adapt the old office to a store-room; but these need not amount to any large sum.

The Shareholders will see by the accounts that there is a sum of £409 8s. 9d. owing to the Company's bankers, which has been advanced by them to pay current claims, and the Directors are desirous of calling attention to this matter, and explaining how it has occurred. It is the custom with gas companies, as the Shareholders are aware, to supply gas for three months before making any demand for payment, and consequently money has to be found for carrying on the manufacturing operations for three months before any return is available. With the companies generally, the unexpended capital in the hands of the directors, and the reserve-fund, or the two together, are used for this purpose; but for the last half year these funds with this Company have been so unusually low that it has been necessary to borrow from the bankers to supplement the current expenditure.

The Directors, under the circumstances, think it advisable to ask the sanction of the Shareholders to borrowing a further sum of £1000 on debenture bonds, which, with the balance of unexpended capital in hand at the present time, they think will enable them to complete the further improvements before mentioned, and leave a small sum in hand sufficient to carry on the business without trespassing on their bankers.

The Directors have much satisfaction in informing the Proprietors that, now the new apparatus has all been brought into operation, they have, as they expected they would, obtained some greatly improved results.

The gas made has, for the entire six months, averaged more than 10,000 cubic feet per ton of coals, and the quality has improved at the same time; and the ammoniacal liquor, which hitherto has been considered waste, is now made available for manufacturing purposes, and may be expected to produce an income exceeding £100 per annum.

There have also been improvements in other respects; for instance, coals (the largest item of expenditure with gas companies) have for the last half year cost only 14s. 7¾d. per ton, as against 15s. 2¼d. in the preceding half year; and the quantity of coke made and disposed of in this half year has been £247, as against £210 in the preceding half.

The consumption of gas has increased, but not in so large a proportion as usual, the increase for the last half year having been only 48,000 cubic feet as against 709,800 feet in the corresponding half year of 1878; but the Directors think this may be accounted for by the very general dulness of trade.

With most gas companies there has been a very large increase in the last half year. This increase, however, has for the most part been in private dwellings, and not in shops; and the consumption of gas in private dwellings in Poole is but very trifling as compared with that in the shops.

The general result is that the profit for the half year is in itself sufficient to pay the maximum dividend, and leave a balance of £81 9s. 11d. applicable to dividend to be carried over to the next account, and this is the course the Directors now recommend.

The Directors have, on two or three occasions before, mentioned to the Proprietors that the loss, or unaccounted-for gas, was very large, being as much as 25 per cent., and that their attention should be specially directed to this matter to get it reduced; and they have now to report that by continually following this up it has been reduced to 13¼ per cent., which, though a great improvement on the former state of things, is still rather high, and they hope before long to reduce it still more.

[The capital of the Company consists of £9600 in £10 shares, entitled to 10 per cent. dividend; £10,520, limited to 4 per cent.; and £7000 in debenture bonds raised at 5 per cent. They are also authorized to raise £19,880, to be limited as to dividend to 7 per cent. The total expenditure on capital account to Dec. 31 was £26,882 13s.; £740 8s. 6d. having been expended last half year.]

Revenue Account for the Half Year ending Dec. 31, 1879.

Expenditure.

To Manufacture—			
Coals, including all charges into the Company's stores, 814 tons, average price about 14s. 5½d.	£588 8 9		
Carbonizing	138 19 0		
Purifying, storing, and selling products in the yard, &c.	25 12 1		
Repairs and maintenance of plant	75 3 0		
Rent, rates, and taxes	57 0 3		
		£885	3 1
Distribution—			
Repairing and relaying services, fixing meters, &c., &c.		47	10 10
Management—			
Directors	*Nil.*		
Auditor, Manager, Collector, and Clerk	£172 0 0		
Stationery, printing reports, books, stamps, &c.	25 17 11		
		197	17 11
Miscellaneous—			
Discounts to large consumers	£76 4 11		
Bad debts and allowances	5 0 10		
		81	5 2
Total expenditure		£1,211	17 7

Receipts.

By Gas supplied during the half year—			
Consumers meters, 6,903,600 cubic feet, at 5s.	£1,725 18 0		
Meter-rents	59 16 0		
		£1,785	14 0
Residual products—			
Coke for sale, estimated at about 40 per cent. on weight of coals, 333 tons, at 14s. 10d.	£247 6 6		
Tar, estimated at 10 gallons per ton, 8140 gallons, at about 2d. per gallon	65 0 4		
Ammoniacal liquor, at 20 gallons per ton; 16,220 gallons, at 60s. per 1000 gallons	48 18 9		
Sundries	4 13 11		
		365	19 6
Discounts		0	17 0
Total receipts		£2,152	10 6
Deduct *Dr.* side		1,211	17 7
Balance transferred to net revenue account		£940	12 11

The Chairman, in moving the adoption of the report, said he wished, in the first place, to show the Shareholders how the £2000 raised by debenture bonds since his election as Chairman had been expended. For this purpose Mr. Budden, their Secretary, had sketched a plan of the works that had been executed, also of the new office and board-room which the Directors hoped to have erected during the year. But here he must tell the Shareholders that on this outlay they had realized a profit of between £200 and £300 a year, besides making a better quality of gas and improving the works. He would now deal with the future. As men of business, they were aware that no trade could be carried on successfully without working capital, and, as would have been observed in the report, the Company were dependent on their bankers to carry them through the half year with credit. The Directors would call a special meeting for the purpose of obtaining authority to borrow £1000 on debentures, and at the same time of considering what course should be pursued with the Bournemouth Gas Company, who had taken possession of, and laid down mains in the Poole Company's district, which they (the Bournemouth Company) had no right to do. This business, however, could be discussed at the special meeting.

Mr. W. Penney seconded the resolution, and, in doing so, said he considered the report was one of the most gratifying the Shareholders had ever received. The Directors were able to pay the maximum dividend, and to carry forward a balance. The quantity of gas produced from the coal carbonized was satisfactory, and they were making £100 per half year from the collection and sale of their ammoniacal liquor. He saw that at Exeter, where the Gas Company manufactured £23,000 worth of gas, they obtained only £957 for their coke, and this item in the report of the Poole Company, who did only one-twentieth of the business, contrasted very favourably with that of the Exeter Company. He must make one remark as to the loss of gas, which was still large—13¼ per cent. It would be very satisfactory to see the percentage much lower. In London the loss was only 4 or 5 per cent. Altogether, however, the report was highly satisfactory, and he had great pleasure in seconding the motion for its adoption.

Mr. Stone objected to the borrowing of money for building a board-room and other things, because he hoped that in a year or two the Company's affairs would be in so flourishing a condition, by reason of their making an extra quantity of gas, that they would be free from obligation to the bank, and he thought it would be better even to pay the bank interest for a short time than to burden the Company with extra bonds and debentures. He moved as an amendment that paragraphs 2 and 4 should be excluded from the report.

Mr. Phillips seconded the amendment, and said in his opinion the proposed works should not be undertaken until they could be paid for out of profits. They were not absolutely necessary, and if the Company kept on increasing their debenture bonds, it would leave a permanent mortgage on the original stock.

The Chairman said Mr. Stone had told them he should object to the Directors report because it recommended an increase of capital; but he (the Chairman) desired to say a few words on this subject. As he had already told them, £2000 had been borrowed on debentures since he had been in office, yet Mr. Stone and one or two other gentlemen objected to the £200 clear profit which was made. They did not seem to care much for the attention the Directors gave to the business of the Company, or for their exertions on its behalf. They had been attacked by the Town Council, and had to spend money in an extraordinary way. The works were formerly a perfect wilderness; but the Shareholders could go and see what they were now, and if they did not find them worth double the money, they were no judges. He did not wish to take to himself the credit of all this work, for the Directors had greatly aided him, and it was due to Mr. Budden to say that he had rendered him every assistance. The Company would not have been able to pay dividends unless the Directors had done what he had mentioned. The new capital required was not for the board-room only. They did not want any money to be raised for that; they could erect the building without any extra capital. Mr. Livesey, their Auditor, however, said they were obliged to contract debts at the bank, and to pay interest for them, and it was absolutely necessary the Company should raise £1000 to carry on the business profitably, and in order to be clear at the bankers, to whom they had to pay a sum of money which would be better paid to the Shareholders. Another serious matter was as to the works at Bournemouth. There was a large district, where a great number of houses were being built, and it would hereafter prove a very profitable part of their business, though not immediately, for they could supply gas at a cheaper rate than the Bournemouth Company could do. Lord Alington had also applied to them to have gas extended to his property, to which they had almost acceded. They could not do this, however, without increasing their capital. If they cramped everything that was done, it was of no use extending their works. He must leave the matter in the hands of the Shareholders. If the Directors had not taken up nearly all the pipes in the town and relaid them, there would have been a constant waste, and it was by the continual improvements they introduced that they were able to pay large dividends.

Mr. Farmer: Supposing the report is passed as it stands, will it not be necessary to have an extraordinary meeting before a resolution as to the £1000 can be passed?

The Chairman replied in the affirmative.

The amendment was then put and lost—7 voting in its favour, 9 against it. The original motion was therefore declared carried. Some discussion having taken place as to the admission of proxies, it was decided to accept them. The numbers were again taken, when there appeared—For Mr. Stone's amendment, 7 votes by show of hands and 10 proxies—total 17; against it, 9 votes by show of hands and 1 proxy—total 10. The amendment was therefore carried.

The Chairman then proposed that a dividend be declared at the rate of 10 per cent. on the A shares and 4 per cent. on the B shares, for the half year ending Dec. 31, 1879.

Mr. Green seconded the proposition, and it was carried *nem. con.*

The retiring Directors, Messrs. Mills and Farmer, were then re-elected, and a vote of thanks to the Chairman concluded the proceedings.

Sutton-in-Ashfield Local Board Gas Supply.—At the meeting of the Sutton-in-Ashfield Local Board on the 6th inst, the Chairman of the Gas Committee (Mr. Littlewood) said that at the close of the first year since the transfer of the gas-works to the Local Board they had in hand a small surplus after meeting all expenses. Considering the dulness of trade, they had reason to be thankful for this. However, they would require about £500 more to complete the purchase, and he moved that power be given to the Committee to raise £1000, when they might be able to extend their mains. The proposition was unanimously agreed to.

Cleveland Water Company.—The twenty-third half-yearly meeting of this Company was held on Thursday, the 12th inst., at the offices, Saltburn-by-the-Sea—Mr. T. Wharton in the chair. The report stated that the revival of trade in the mining districts is beginning to largely increase the consumption of water both for household purposes and for mining engines. The receipts of the Company have slightly risen in the past half year, instead of declining as in previous half years; so that, after providing for interest, rent, and other preferential charges, there remains a balance of £2186 4s. 8d., out of which dividends were recommended of £6 10s. per cent. on the original and A shares, and of £4 11s. per cent. on the B shares (free of income-tax), leaving a balance of £266 to be carried to the credit of next half year's account. The capital account showed that the total expenditure to the end of last year was £77,479 6s. 2d.; while the receipts were in ordinary shares exclusively, all loans and mortgages having been paid off. The receipts on revenue account for the six months were £2746 14s. 6d.; balance from previous half year, £298 5s. The half year's working expenses absorb £734 17s. 4d., interest on redeemed loans and prepayment of calls require £123 17s. 6d., leaving, as above stated, £2186 4s. 8d. available for dividend. On the motion of the Chairman, seconded by Mr. Whitwell, the dividends recommended in the report were declared. The retiring Director (Mr. F. Fox) and the Auditor (Mr. J. C. Simpson) were re-elected; and a vote of thanks to the Chairman, Directors, and Officers of the Company was unanimously awarded.

MR. WARNER'S MACHINERY AT THE JARROW WORKS OF THE SOUTH SHIELDS GAS COMPANY.

Last Thursday, at the invitation of Mr. W. J. Warner, the Engineer of the South Shields Gas Company, a large party of Gas Engineers and Managers, and others interested in the question, visited the Company's Jarrow works, to inspect his patented machinery, more especially in connection with the charging and drawing of the retorts, but also for raising and lowering the covers of the purifiers and discharging their contents. In last week's issue we gave a general description of the apparatus, and may now add that complete drawings of the machinery are being prepared, and from these we shall have illustrations engraved for insertion in an early number of the JOURNAL.

The inspection of the machinery occupied a considerable time, an extended trial of the drawing and charging machine being made. Twelve retorts were drawn and charged in less then 13 minutes, and this time would have been somewhat lessened had not delay been caused by one of the retorts being choked. Mr. Warner then minutely described the various parts of the machine proper and their uses, as well as the appurtenances—such as the arrangement for filling the coal hoppers, the removal of the coke from the retort-house, &c. In the purifying-house the very neat arrangement of the crane for moving the covers of the purifiers was much admired, the facility of its working being put to a thorough test. The other parts of the works came in for a large share of attention, though naturally the greatest interest was manifested in Mr. Warner's retort-house arrangements.

At the conclusion of the inspection, the company sat down to luncheon in the basement of the purifier-house. Dr. R. WALLIS, J.P., the Chairman of the South Shields Gas Company, presided; and was supported by Messrs. HALL and HENDERSON, Directors of the Company.

The toast of "The Queen and the rest of the Royal Family," after a right loyal speech from the CHAIRMAN, was drunk with much enthusiasm. After which,

The CHAIRMAN said: Gentlemen, it is easy enough to address a large mixed assembly, or a party of old and valued friends, on whom you can depend to be lenient to your shortcomings; but to address a small select meeting of scientific gentlemen, and gentlemen of education and refinement, on a mechanical invention, is more than I can do, and therefore I will not attempt it. And yet I was proud to take the chair to-day, as it enables me to do what I can do with the greatest sincerity and pleasure, and that is propose the health of my esteemed and valued friend, Mr. Warner, and success to his invention. The invention you have seen to-day is not the outcome of a hasty inspiration; it is the result of many years of earnest and deep thought. During the whole of these years I have enjoyed Mr. Warner's full confidence, and have watched the progress of his invention, as it proceeded step by step to what I firmly believe to be perfect success. It is only for you scientific gentlemen to-day to endorse that opinion, to place my friend on the flow of that tide which leads to fortune—to place him amongst the most honoured and successful gas engineers of the day. He is, I am aware, not unknown in the annals of gas engineering. He has already made his mark by other inventions, and has been chosen President of the British Association of Gas Managers. Mr. Warner has the full confidence of the Directors and Shareholders of the South Shields Gas Company. They believe him to be an able Engineer, a warm, attached friend, and an upright, conscientious man. The works which you see around you, which are now drawing very near to completion, have been planned and executed solely and entirely by himself. Many of you can see for yourselves that they have been well done, and we (the Directors of the Company) can say they have been done cheaply, and with an earnest desire to promote the interests of the Shareholders. We are apt, on such occasions as this, to over-estimate, to attach too great importance to the subject we wish to advocate. But, gentlemen, if by your verdict to-day you stamp this invention as a success, I really think we cannot estimate it too highly. In discussing that great question of the day recently—the merits of gas *versus* electricity—it was admitted that gas was a more pleasant, more controllable, and more useful light, but could it be produced as cheap as by electricity? The question was answered in the affirmative; and if this were so then, what must it be now, when we are ready to affirm that by this invention, by the substitution of machinery for manual labour, we can do away with that severe unhealthy toil—that wasting of the flesh and blood of the stokers—which must bring depression to both mind and body, possibly shortens their existence, and certainly creates a craving for strong drink? If by this invention we can add dignity to labour; if we can call forth a large demand for skilled labour, which will improve the mental and physical condition of the people; if we can, by the same means, lessen the cost of production of gas by reducing to one-half the expenses of the retort-house; if we can get more and better gas per ton of coal—I think you will agree with me that gas shares will and can hold their own against all present or future competition. Considering the immense capital invested in gas manufacture, the importance of Mr. Warner's last invention can hardly be over-estimated. The man by whose talent and ingenuity we are enabled to do this is worthy of public acknowledgment, and I would suggest this could not be more usefully and graciously shown than by forwarding the promotion of the Company now about to be formed for the working of the patent.

The toast was received with musical honours.

Mr. WARNER, in responding, acknowledged the reception accorded to him and his invention, and said: Gentlemen, the most important matter in connection with this gathering to-day is the fact which has been educed by it, that the subject of retort-house machinery is now receiving the serious attention of many of those engaged in the manufacture of gas. I have been favoured with some very encouraging letters on the subject, but the most satisfactory, and that which I have no doubt will be the most interesting to you, is one from the Chairman of the Phœnix Gas Company, London. It is as follows:—"London, Feb. 17, 1880.—Sir, I have received through Mr. Moore an invitation to view the machinery in action whereby the whole work of the retort-house is done without ordinary manual labour. I regret that I am unable to accept it. For years I have strenuously advocated the use of machinery instead of the ordinary method; hitherto unsuccessfully. I read the account sent to me, extracted from the *Shields Daily News*, which fails to show the pith of the matter—viz., how does the cost compare with manual labour? The machinery itself may do its work perfectly, but, in a money point of view, not economically. Do not trouble yourself to reply to this, but inform the gas world through the JOURNAL as to the cost of working, &c.—I am, &c., E. Horner, Chairman of the Phœnix Gas Company." Nothing, gentlemen, I take it, could be more gratifying to us, upon such an occasion, than Mr. Horner's letter. The Chairman of this large and prosperous London Company has for years been advocating the use of machinery, and yet nothing has been successful. I have to-day shown you machinery that has had, in one respect, the wear and tear of 2½ years. I take this to be the most important fact in connection with the matter—the successful working of retorts by steam power—for the reduction of cost must, as in every other case of the substitution of this power for manual labour, follow its successful application. But this, to use Mr. Horner's own words, is not "the pith of the matter;" it is the comparative cost; and I will at once answer this question. The system is more economical. The saving that will be effected by the house which you have just inspected will amount, when the house is in full work, to £1000 a year. I will give you the facts upon which I base this estimate. I take the cost of plant at £200 per bed; but as in this amount is included the cost of plates for the floor, with framing and pillars for supporting the same, it seems hardly fair to do so; but I take the £200. Well, 10 per cent. on this for interest, though we are paying but 7, will amount to £20; to this I will add a sum for wear and tear, £20; making a total cost for machinery of £40. Now, if we take a fireman's wages at 35s. per week, which will amount to £91 a year, and add for coke trimming, &c., £9, making £100; deducting for wear and tear and interest £40, leaves £60 a bed as a balance. Multiply this by the number of beds—30—and we have for labour and profit, or gain, £1800. Now as to the labour. At the present rate of working one retort a minute, two men could work 6-hour charges every two hours through each shift, and would have an interval of an hour between. The wages of the two men for each shift, at 30s., would come to £6; to each shift I will give four men, at 25s., or £10. For working hoists and fire-making the cost would thus be £16 per week. Multiplying this by the weeks—52—gives £832. This deducted from £1800 leaves, in round figures, £1000. To this also we might add wear and tear of ordinary working, which you know is considerable. I have not either charged anything for steam power, because we work the same boilers as for the exhausters and purifying-house; and fuel I have assumed will be more than amply compensated for by the lessened waste of stacking the coke. The £200 which I have taken as the cost of each bed, and for which sum the work may at once be done, is somewhat startling when placed in juxtaposition with the £100 a year, which may be taken as the cost of working a bed. Thus two years work will redeem the plant. But, gentlemen, there is a still more startling fact, and it is this: Taking the cost of carbonizing at about 3d. per 1000 feet, we have a charge for labour, with coals at the price they were not long since, amounting to something like 50 per cent. of the gross cost of the coal; that is to say, we in this neighbourhood pay half as much for simply lifting the coal a few feet and putting it inside the retorts and disposing of the coke as is paid for winning the coal, for royalties, for interest on machinery, for railway dues, and for the coal itself. This state of things is a grave reflection upon our manufacture in these mechanical times. I have not here taken into consideration any advantage arising from regularity of the charges, or the reduced waste of gas during the operation; but experience will show a decided gain. There is, too, another advantage arising from the use of machinery which is of great value to such a manufacture as ours; that is, the diminution of the risk of strikes. It has been said that if this advantage alone could be secured, it would justify the use of machinery. With regard to the cost of working, I should say a few words as supplementary to the explanation which I have given. First, with regard to the staff for working. I have alluded to the full working of the house; but, as in the case of manual labour, the number of men may be reduced as the beds are let down—indeed, the work may be so arranged as to have only one man on during each shift, with a small number of retorts in action. It was for this purpose—the economy of labour in working moderate-sized houses—that I decided on single beds being constructed in the house. As to the machinery itself, it will have been seen that it may be divided into three separate and distinct portions—the coal-feeding, the charging and drawing, and the delivery of the coke. Now, it is manifest that the whole of this will not be needed in every house. With stage working, the coke will be removed in the usual way; and as to the coal, as long as the buckets are filled and suspended, the requirements of the machine are met. Hence the machine may be used alone, or in combination with the other two. But the arrangements made for doing the work should be such that it should be as far as possible progressive. By this I mean that the charges should be prepared first and made quite ready to feed the machine, that it should then do its work of drawing and charging, and after that the coke should be removed. Thus the work is systematized and carried on with the greatest economy. It has been remarked that the responsibility of the Directors in connection with this matter has been very considerable. Well, I will not say one word to lower the estimate of their bold and enterprising spirit. I commend it to you. But may it not be asked whether there would not have been a greater responsibility attaching to them, had they not, in putting down such works as these, attempted to deal with this question? and I ask, were they not justified in running the risk by the large cost and great irregularity of manual labour?

Mr. HALL, after referring to the proceedings of the day, and the important invention of Mr. Warner, said he and the other Directors of the Company were glad to see present with them so many distinguished and scientific gentlemen connected with the manufacture of gas. He could assure them the invention by Mr. Warner had occasioned the greatest possible interest among the Directors, and they were rejoiced to know of its success. He had great pleasure in proposing the health of the visitors, associating therewith the name of Mr. Hunter, of the Salford Corporation Gas-Works.

Mr. HUNTER said his attention had long been given to the various inventions introduced in connection with the manufacture of gas, and he had had much pleasure in attending at South Shields and witnessing the improvements introduced by Mr. Warner. Speaking from what he had seen, he must say that great credit was due to Mr. Warner for the very ingenious contrivance he had introduced to their notice. He (Mr. Hunter) had seen several machines which professed to be capable of doing the work similar in character to that of Mr. Warner's machine. The vital point, of course, was the reduction in the working expenses; and, as far as he was able to judge from what he had seen, Mr. Warner's invention appeared to meet this. He had taken the opportunity of noting the time which it required to do the work, and it was very satisfactory. Of course, under the circumstances, before he expressed any definite opinion, he should like to have an opportunity of maturing his views; although, he must say, from what he had seen, he was pleased with the invention. Mr. Warner was a gentleman who occupied a high position among gas engineers, and he was thought so highly of by them that they had given him the highest possible position they could confer upon him—namely, that of President of the British Association of Gas Managers, the duties of which he had discharged with credit to himself and with honour to the Association, and they looked upon him as the leading man of their time. When they came to South Shields and saw the success which had attended his efforts, and the esteem in which he was held by the Directors of his Company, it was highly gratifying to them, and they sincerely wished him still greater success.

Mr. W. ROBSON, Chairman of the Sunderland Gas Company, gave the health of the Directors of the South Shields Gas Company.

The CHAIRMAN returned thanks on behalf of himself and his co-Directors.

The health of the Mayor of Jarrow (Dr. Huntley) was proposed by Alderman WILLIAMSON; and several other toasts having been duly honoured, the Company separated.

Mr. Warner, in his attendance on the visitors, was ably assisted by Mr.

Whyte, the Resident Engineer at the works; while Mr. Joseph Fenwick, the Foreman, performed his part in a most satisfactory manner, having, during the six months the machinery has been at work, thoroughly mastered every detail of the arrangement, so that no hitch occurred. The proceedings were at intervals enlivened by the strains of the bagpipes, efficiently performed by Mr. John Calder, late of the 72nd Regiment, but now in the employ of the Company.

BIRMINGHAM CORPORATION GAS SUPPLY.

A Special Meeting of the Birmingham Town Council was held on Tuesday last—the MAYOR (Mr. R. Chamberlain) in the chair—when the annual report and accounts of the Gas Committee to Dec. 31, 1879, which appeared in the last number of the JOURNAL, were presented. The report having been taken as read,

Alderman CHAMBERLAIN said: I have to move—"That the recommendation of the Gas Committee, that the balance of the profit and loss account be appropriated as follows—namely, £25,000 to the borough improvement rate, and £26,165 18s. 4d. to the sinking-fund for the reduction of loans and annuities—be approved." I shall have to follow that up by resolutions authorizing the Committee to obtain tenders and enter into contracts for the extensions proposed in the report, and to confirm the provisional agreements which have been made for the purchase of land, which I will explain in due course. The interest of what I have to say has been to a very large extent forestalled by the necessary previous publication of the accounts of the Gas Committee, and what would, under other circumstances have been a really marvellous and exciting story, must now become in my hands, and under the conditions in which I speak, a mere common-place recital of a rather complicated series of figures. If I could have handed you the accounts at the same time that I rose to address you, I think I might have kept you in suspense, if not in anxiety, for a considerable period. In that case I should have led you back to last year, and I should have reminded you that, standing then in my present place to move the annual report of the Gas Committee, I had the pleasure to announce a profit of £54,832; but I should also have to have said that you approved on that occasion of a recommendation to reduce the profit by reducing the price of gas. You authorized a reduction of 3d. per 1000 cubic feet, which we anticipated would cost the Corporation £30,000, and as a matter of fact it has cost £33,000, and there at a stroke the £54,832 is reduced to £21,000. It would be further reduced by certain items in which we have to lament an increased expenditure. During the year which has passed we have spent £1000 more on legal proceedings, and I may say that there is no item of expenditure which is more thoroughly unsatisfactory, or which I regret more than I do this one. We have also had to pay, in the shape of increased income-tax, something like £600. No explanation, I think, will be necessary as to that item, and the experience of all business men present will suggest that in our case, as probably in theirs, the zeal and activity of the officers of the Revenue Department have produced results satisfactory perhaps to the Chancellor of the Exchequer, though anything but satisfactory to the parties who have to pay the tax. We think this zeal has, in our case, been a little misdirected, and we have a dispute with the Revenue Department as to the principle upon which they hold us assessable to the income-tax. This matter has not yet been settled; if we cannot agree with the officers here, we shall certainly appeal to London; but, in the meantime, we have had to pay £600 more for the twelve months than for the preceding year. Together, these items make £34,600, and would leave only £20,000 profit. Here I should have paused. I should have called your attention to the frightful consequences to the Corporation and the town if it had been found that the profits of the gas department had not sufficed to pay the sum which we had allotted to the improvement rate, and did not leave one penny for the sinking-fund; but, knowing that all of you have before you the accounts, which show a profit for the present year, in spite of these circumstances, of £51,165, it is not open to me to employ this rhetorical device, and to keep you on the tenter-hooks. It remains only for me to carry out the prosaic duty of building up again this profit, and to show you how what we have lost has been compensated for by various items of decrease. In the first place, we have bought coals at a lower rate than formerly, and, during the past year, we have saved on this item £7500. The liquor contract, which was in existence the previous year for six months only, has been running for the whole of the past twelve months, and that has brought us in an additional £8000. In the shape of repairs, including repairs to mains and meters, we have expended on the whole £2000 less than previously. These three items would bring the profit up again to £37,500; but, in addition, we have to add for the first time an item for interest on the reserve-fund. The reserve-fund having been made up to the full parliamentary standard, the interest upon it is no longer added to the fund, but comes into the profit, and we get £2000 under that head. The burden of the loans is less in proportion to the amount returned by £2500—that is to say, that if the loans had increased in the proportion in which trade has increased, we should have had to pay £2500 more than we actually have found it necessary to pay. These two items, added to the figure I previously gave, brings the profit up to £42,000. Then we have—thanks in a great measure to the improvement which has been made since the transfer of the gas-works to the Corporation—lessened considerably the cost of manufacture, and under the heads of wages and general management we have saved the sum of £2000. We have also saved £500 in bad debts, which are less by that amount than they were before, and now stand at a lower figure than they have ever done, I venture to say, whether during the period we have had the works, or in the previous history of the Companies. The remainder of the sum which is required to make up the profit shown in the accounts is due to the increased sale of gas, which, as the report states, amounted last year to 6 per cent. Now, just let me say, in passing, that I think it is very satisfactory, and greatly to the credit of the Manager, and especially the permanent officers of the department, that the bad debts have been so considerably reduced. During the four years we have had the control of the gas business, this item has stood thus: In the first year, £3800; in the second, £3400; in the third, £2700; and last year, £2200. If you consider that this is the entire amount of loss on credit for a return which amounts to half a million sterling, and that it is at the present time less than half per cent., I think you will feel that it is a very satisfactory result, and that traders generally would have good cause to congratulate themselves if they could show anything of the same kind. Now, the point for the consideration of the Council, having obtained this profit of £51,165, is to decide what they will do with it. We have already appropriated £25,000 of the amount to the relief of the rates, and we suggest that the £26,000 odd should be carried to the sinking-fund. Last year I ventured to impress upon the Town Council that, having regard to the risks of a great undertaking like this, and the extent of our capital obligations, it would be the wish of our constituents, as I am quite certain it is consistent with all rules of safe business, that our sinking-fund should in the future be not less than £25,000 per annum. As I believe the Council approved that suggestion, very little need be said to-day in order to induce them to accept our present recommendation. I do not think that £25,000 is a penny too much to write off each year from this great undertaking. On the other hand, I think it is amply sufficient, having regard to all the circumstances of the case. I should like to call the attention of the Council for a few minutes to the state of the capital account, and to certain considerations which it naturally suggests. At the present time the capital amounts to £2,153,000. This seems an enormous sum of money; but, having regard to the business which is carried on by its means, I say that it is an extremely moderate capital, and in my opinion is much less than the works of the undertaking are worth, provided they are worth anything at all. Now, I have had the curiosity to make a comparison between the value of our property as it stands on our books and the value of the property of another great gas undertaking as it is estimated in the market; and for the purpose of this comparison I have taken the figures of the Phœnix Gas Company, because I happen to be a Shareholder in that Company, and in possession of their report. Taking the Phœnix Company's capital at its present market value—it has been in the last two or three years slightly reduced—I find that it stands at £2 per 1000 cubic feet upon the annual make. Apply that to our annual make of 2645 million cubic feet, and I find that our capital, if it were at the same rate as the market value of the capital of the Phœnix Company, would be not £2,153,000, but it would be over £5,200,000; that is to say, the market value of another gas undertaking—one of the principal gas undertakings in London—stands at more than two and a half times the amount of our capital. This, I think, is at all events a satisfactory comparison. But now I want to dissect our capital a little, because of this sum of £2,153,000 there is a considerable proportion which is as good as cash, and can be realized for cash at any moment. There are, for instance, the reserve-fund, the sinking-fund, and the stores of coal and coke, and other materials of that kind, and they amount together to £170,000. Then the balance of debts owing to us, over and above debts which we owe, and which, of course, by this time have been collected, as regards the year is £90,000. The freehold lands belonging to the Corporation in connection with the gas undertaking have recently been the subject of a careful valuation which was made for the Gas Committee by surveyors appointed for the purpose in Birmingham and West Bromwich, and they amount to £250,000, and would, of course, always have their value whatever might become of the gas undertaking. Then four of the neighbouring Local Boards are pledged to buy of us a portion of the undertaking. Assuming that the award which has already been given in the case of West Bromwich is sustained, and that the Corporation are unsuccessful in their attempt to upset it, and assuming the other Boards have to pay in the same proportion, I find that something like £170,000 is coming to the Corporation for this item, and these together make £680,000, which, deducted from our capital, leaves £1,473,000 as the net value of the machinery, plant, buildings, and the goodwill of this vast undertaking. Now, the sinking-fund which I ask you to make up to-day, added to the £4000 which the Committee have already carried to the same fund, will give you £30,000; and £30,000 per annum, reckoned at 4 per cent., will wipe off every penny of this million and a half in 28 years—that is to say, in less than one generation. I think when we do that we may consider we are careful stewards of the property of the ratepayers, and at the same time making a prudent provision against a possible future. Assuming for a moment that I have carried the Council with me so far as the past is concerned, it will be interesting, perhaps, to say a word or two as to the future. In the future we have to face, for the first time in our history, a greatly-increased price of coal. Already the quotations that come to us are much higher than they have been, and we do not know to what point they may be carried. Of course, in talking of the future, it is a mere matter of estimate; but I assume we shall have to pay £20,000 more for our coal during the ensuing twelve months than we did during the last. If the matter rested there, the Committee would be justified in asking you to raise the price of gas at once by 2d. per 1000 cubic feet. Well, we do not do this for two reasons. In the first place, because we are not desirous of disturbing the present price of gas more than we can possibly help. We would sooner submit to a somewhat lessened profit, or a rather lower sum carried to the sinking-fund, than be continually changing the price consumers are called upon to pay for gas. And then the state of our accounts and the system on which they are kept is now such that we have prepared and submitted to us every month a statement of profit and loss during the month, and, although this is not exactly accurate, yet it is sufficiently so to keep us always pretty well informed as to what we are doing; and if we found that we had made a mistake, and that it was necessary to come to you for a rise in price, we could do so at any moment, and certainly this is one of the occasions on which we would rather come a little too late than be at all premature. I have one or two grounds also for hope that any such claim upon the consumers will be unnecessary. In the first place, although we shall have to pay more for coal, we may reasonably hope that we shall get something more for our coke, which, as I have always told the Council, is to be considered at the same time as you consider the other items of expenditure. Last year I pointed out that this coke question was the great difficulty of the Gas Committee. At that time we had a very great deal too much. Now, I am sorry to say, we have a great deal too little. We have certainly relieved ourselves of all anxiety in this respect. We have reduced the stock of coke by something like 28,000 tons. It is less at the present moment than it has ever before been at a similar period, and I think we are in a position to ask and obtain higher prices for what we may still have to sell. I must stop here to say that this result, which has relieved the Committee of very much anxiety and trouble, is largely due to the assiduity, business ability, and skill of our Secretary, Mr. Edwin Smith, of whom I do not find it possible to speak in too high terms. He has taken a great deal of pains with reference to this particular matter, and in consequence of the arrangements which he and others have made, I find that in the town the sales, which we were very anxious to increase, have been raised by 30 per cent.; while the surplus of old coke, which troubled us so much last year, has been exported from the district, at what I venture to say is, under the circumstances, a fair price. The extent of the difficulty will be best understood by the Council if I tell them that I have heard of a very large gas undertaking in another place which has actually had to export its coke to Belgium and the Continent, not only getting nothing for it, but actually paying a considerable price to the contractor to take it away and clear it from the yard. I reckon that this year we may count on £5000 extra from this item, and this will reduce the increased cost of coal to £15,000. For that increase I hope to find compensation in an increased sale of gas. The present sale of gas is 2645 million cubic feet per annum, which is, I think, the highest sale of any company in the world, except, perhaps, the largest of the London Companies—it certainly is very much larger than that of any other provincial town. Large as it is, however, I want to remind the Council that it is really much less, and not more than it was estimated it would when the transfer of the gas-works was made to the Council. The fact is that circumstances have so far been rather against the Council than in their favour. We might have done better if trade had been in a healthier condition. When the matter was first recommended to the Council, I think I said we could rely upon an increase at the rate of 5 or 6 per cent. compound, and subsequent experience and the knowledge I have gained, and my experience of other undertakings, convinces me that 6 per cent. compound is not at all

too much to reckon upon. That 6 per cent. compound, in the four years during which we have had possession of the gas undertaking, ought to have increased our sales 26 per cent. As a matter of fact, we have only increased them 16 per cent. We have therefore 10 per cent. to make up. To put it in other words, the increase in the sale of gas, making allowance for the loss of Walsall, is 325 million cubic feet in that time, whereas it ought to have been during the same period 680 million cubic feet. I do not doubt for a moment that this falling off in the normal rate of increase is only temporary. My own conviction is that it is partly due to the fact that the Council have supplied better gas than the Companies did; and, in the second place, that they have rearranged the mains and the pressure, and that consequently there is a more equable pressure throughout the town and district than there used to be in time of great stress. Making allowance for this, I see no reason to doubt that, with continued improvement in trade, we may not only increase our sale in the future at the rate of 6 per cent. compound, but make up for what we have lost in the past, and may find, as I believe the Companies did, that in a single year the increase amounts to as much as 15 or 20 per cent. If this should be so, then I think we have every reason to hope that even the large deficiency of £15,000, to which I have referred, may be made up by the profit upon an increased sale. I hope whoever stands in my place next year may have a statement to make as satisfactory as that which I have made to-day. There is one other point to which I wish to call your attention. I observed some time ago a report of a meeting of the Council, at which there was a discussion in reference to the gas profits. On that occasion one member argued that the Council were not entitled to estimate any profits at all. I would ask, in the name of common sense, why not? The inducement—the chief, I may say the only inducement which has ever been offered to the Council that they should undertake the vast responsibility of the gas supply was the promise that if they would do so they would make a profit, and be able to apply that profit in relief of the rates. What other possible ground could there be for saddling the ratepayers with the responsibility of this enormous concern, or laying upon the shoulders of the Council and the Gas Committee all the burden and anxiety of managing this great undertaking? I may add that when we were applying for the Act of Parliament by which these concerns were transferred to the town of Birmingham, the evidence turned entirely upon this question of profit. I was examined during, I think, the best part of three or four days, upon my estimates, and the amount of profit which I had said I believed the Council would make, and I then declared my conviction that, with anything like decent management, these profits would amount to £20,000 a year to begin with, and would rapidly go up to £50,000 a year or more in the future. It was upon this evidence we obtained our Bill, and in the Bill you will find the most careful arrangements, the most definite details as to the application of the profit when we have made it. Again, do not let it be supposed that we are singular in making a profit out of our gas undertaking. We are not the only Corporation who have control of the gas supply. The other day we sent round a circular to the leading Corporations in the kingdom, and I believe in every case, with one exception, they were carrying large sums from the profits of the gas undertaking to the relief of local taxation, beginning with Manchester, which stood at the head of the list, carrying the sum of £54,000 to its improvement rate. I cannot help thinking that this argument is really based upon a delusion which seems to prevail rather widely amongst a certain political party in the town—namely, that you can take two from two, and two will remain. There may be people who think you can reduce the price of gas 2d., 3d., or 4d. per 1000 cubic feet without increasing the rates proportionately at the same time. What I must ask members of the Town Council and gentlemen outside to keep in view is this—that the two things go together. You can reduce the price of gas to-day if you like, and your profits are sufficient to admit of it. You can take off 2d. per 1000 cubic feet; but if you do, you must revise your estimates for the improvement rate, and add 5d. in the pound to that rate; for every 1d. per 1000 cubic feet taken off the price of gas means 2½d. additional to the improvement rate. This is the exact proportion, and it is not fair, it is not honest for gentlemen to go to any meeting and talk to people about the propriety of reducing the price of gas, unless at the same time they tell them that it would necessitate the raising of the rates. If the Corporation and the ratepayers, then, desire that the rates should be raised in order that gas should be supplied for nothing, I, personally, have not the slightest objection; but it is absolutely impossible that one thing should be done without the other. But let me point out that there are certain classes of people whom an arrangement of this kind would suit very well, and to whom it is distinctly a matter of interest that they should get their gas cheaply, even if the rates are raised. For instance, there is the case of the Local Boards, who do not pay rates at all. It would suit them very well indeed that the Corporation should undertake to do this work, to give its attention and its time and the business ability it can command to serve the gas department, and make a great saving by means of its credit and its capital, and give all these away to the inhabitants of Aston, Handsworth, Balsall Heath, Wednesbury, and West Bromwich, asking nothing in return; but I cannot see how anybody but a ratepayer in those parishes can say that such an arrangement would be satisfactory to the people of Birmingham. Then, again, there are, no doubt, certain manufacturers in Birmingham, the exigencies of whose trade require that they should use a very large and exceptional quantity of gas, and in such cases it would suit them better to pay 1s. extra to the rates if they could get 3d. per 1000 cubic feet taken off the price of gas. But this is not the case with the majority. I warn the Town Council that the vast majority of the hard-working, industrious people of Birmingham—whether they belong to the smaller and middle-class manufacturers or to the working-class—have a much greater interest in the reduction of the rates than they have in the reduction of the price of gas; and that to reduce the price of gas inordinately without reason, to insist on giving away the profits we have made, and which nobody else could have made, would be simply to commit a sort of financial suicide, to which I do not believe the Council would ever agree. As I have said before, all turns on that last point. If it can be shown that we have not fairly made the profit we carry to the rates, then I ask you by all means to correct my figures, and make such reduction as you think the circumstances justify; but at present my own conviction is that, so far from carrying too much to the rates, we are carrying too little, and that this will very shortly have to be altered. I told the Council, to begin with, that I expected in a short time to make £50,000 per annum from the gas undertaking. The thing has turned out better than I had expected, and I say we ought to make £50,000 per annum earlier than I had anticipated or predicted. We should long ago—I venture to say two years ago at least—have carried a larger sum than we have done to the reduction of taxation if we had not thought it wiser, under the circumstances, to increase the provision we have made for extinguishing the debt in the future. But having carried that provision up to what I think is pretty nearly its maximum point, you have a right now—and I invite you to turn your attention in the future to this point—to see whether it would not be fair at no distant date to carry a larger proportion of your profit to the relief of the improvement fund. I showed last year, and therefore I do not propose to repeat the demonstration that we are at the present time selling gas lower than any other town in the kingdom, except two, where the circumstances are very exceptional. I showed further that we were selling gas cheaper, having regard to the proportionate price of coal and coke, than the Companies ever did, and, therefore, than the Companies would have been likely to do if they had continued to go on with their work. And I showed still further how it was we were able to do this—from what source we derived this additional profit. I laid it before the town and the Council, and I asked them to show whether they could fairly believe that this saving which we had made would not have been made by the Companies if they had continued as separate institutions. Since that time nobody has attempted, either in the Council or at any meeting outside, to disturb these figures in the slightest degree. Nobody has submitted others for them, and until they are altered I maintain my previous opinion, and I hope the Council will support me in it—viz., that the profit we have made is ours, that we have a right to do with it what we like, and that what we shall like to do with it is to carry it to the relief of taxation. In conclusion, I venture to say that at the present time this vast undertaking was never in better order. It is admirably officered. I have already had occasion to refer to the services of Mr. Edwin Smith; but I may say now we have equally good reason to be pleased with the work of our Engineers, Mr. Hunt and Mr. Hack. Indeed, we have thorough cause for satisfaction with all the officers of the establishment. I have never known, in my experience, a vast undertaking work so smoothly and so entirely to the contentment of its proprietors. I venture to say also that we are now well furnished with the latest appliances in every respect. There is not one of these works which belong to you which has not been materially and strikingly improved since they have been in the hands of the Corporation. You will see that the money which has been expended in this has not been thrown away, as you will find if you will follow me for half a minute in some of the results of the undertaking. There are three or four matters to which every gas engineer would at once turn his attention if he were called upon to pronounce upon the comparative merits of the different undertakings. In all these respects the improvement is generally owing, I think, to the greater care taken in the management. The improvement in the works has been very marked during the last four years. I find, for instance, that during that period the amount of fuel required to carbonize the coal which is made into gas has been reduced from 21 per cent. to 17 per cent.—a reduction of 4 per cent. in the amount of fuel used. The production of gas per ton of coal during the same period has been increased from 8700 cubic feet to 9100 cubic feet, being an increase of 400 cubic feet per ton. The waste or unaccounted-for gas has been reduced during the same period, I may say, by 2½ per cent. It is very difficult to speak positively upon this subject, because we only arrive at the result by a series of complicated and compensatory calculations; but I believe I should be speaking the truth if I said that we had reduced the waste by 4 per cent. I am certainly moderate in putting it at only 2½ per cent. At the same time the wages at the works are, I find, £500 less for the last twelve months than they were in 1876, and yet in the interval the make of gas has increased no less than 250 million cubic feet. If the wages had increased in the same proportion, they would have been £3500 more, instead of being £500 less. These are the four points to which I believe I have never before called your attention. They are four points of the greatest importance, with respect to which we have made this considerable saving. I have never made any claim for the Corporation on behalf of this saving. I have assumed that exactly the same results might have occurred under the management of the two Companies; but at the same time it is not common sense not to recognize that, when a great undertaking like this improves continuously in every branch, there is some special credit due to those who have control of it, and that you may give to them their reward in allowing them to allot a proportion of the consequent profit which has been made. Under these circumstances, I appeal to the Council to confirm the recommendation which the Committee have made to them by my mouth, and I hope that in so doing they will approve the principles upon which this undertaking has been conducted, and will justify the Committee in continuing the work upon the same lines which in the past have produced such excellent results, and which, if they are fairly and consistently adhered to, will produce still better, still more signal and striking advantages at no distant future.

Alderman MANTON, in seconding the motion, said every member of the Council must feel himself much indebted to Alderman Chamberlain for the clear and satisfactory statement to which they had listened.

Mr. BEARD criticized the work of the Gas Committee at some length, and, comparing the statistics of the old Companies with those of the Corporation, asserted that no profit was to be found except in the speeches of members of the Council. There was nothing to show but what the whole of the £80,000 which had been carried to the relief of the rates for the last three years had not been obtained from the exceptional charges and advantages in the lower price of coal and increased value of ammoniacal liquor, by which the Corporation had benefited, and every farthing of which ought to have gone in a reduction of the price of gas. So long as he had the opportunity of occupying a position in the Council, he should defend that which he believed to be honest and right, and he said it was not fair and it was not equitable to saddle the whole of these charges upon the gas consumer, without his receiving from time to time some consideration at the hands of the Council. He asserted that there was nothing upon the face of the balance-sheet to show that the prophesied savings had been made other than by the charges on the gas consumer. They were told that the Directors fees were saved, but then the Gas Committee had established a reserve-fund which had taken a sum of money that would not only have paid the Directors fees, but have left a surplus. With regard to leakage, Alderman Chamberlain had placed the matter before the Council in a way which was not only misleading, but was not to the advantage of the Gas Committee. He (Mr. Beard) could tell them why Alderman Chamberlain took the years 1874-5, and compared them with the results of to-day.

Alderman CHAMBERLAIN: No; 1876 and 1879.

Mr. BEARD said that to compare 1876 was not fair, because in order to have a fair and equitable comparison they should go back to the time before anything was disturbed by the purchase.

Alderman CHAMBERLAIN: There were no previous returns.

Mr. BEARD said Mr. Robert Jones, an eminent engineer, was employed to inspect the works, and in his evidence before the House of Commons Committee he said that he found the leakage under both Companies was 7 per cent., which was very low. When asked what advantage would be obtained by the purchase, he replied that when large mains were substituted for the two smaller mains the leakage would be reduced to 3 or 4 per cent. Now, he (Mr. Beard) asked what was the leakage for last year. He took the official statement of the Secretary of the Gas Committee, and compared it with the total gas sold to the consumers, and he found the leakage was 8¾ per cent., and if he went back to 1878 he found it was 9¼. Therefore, he said that, instead of there being a saving under this head, there was a positive loss. After alluding to the Corporation giving away coke, which he described as a most extraordinary thing to do, he contended that it was to the interest of Birmingham that the Council should at all times recognize the great smelters in the districts surrounding

Birmingham. If the Corporation had been more liberal in the prices at which they sold their coke in 1876-8, there would have been no necessity to give it away in 1879.

Alderman AVERY said that, with regard to the very admirable address of Alderman Chamberlain, he fully accepted the substance of the arguments and the very interesting and conclusive facts which had been adduced. He regarded the statements of Mr. Beard as exceedingly erroneous, that gentleman not only misleading and deceiving himself, but making statements which had a tendency to mislead others. In his (Alderman Avery's) opinion, Alderman Chamberlain's figures had not yet been impeached; for, in fact, they were unimpeachable.

Alderman CHAMBERLAIN, in reply, said he was not inclined to complain of honest and impartial criticism of the proceedings of the Gas Committee, because he was quite sure that all such criticism was likely to be fruitful. He did not complain, and had no right and no wish to complain of what Mr. Beard called his independent position; but he did complain that when Mr. Beard fancied he had established, on information which must necessarily be imperfect, charges which, if they were true, would be extremely serious charges against the Gas Committee, he did not in the first instance give them the benefit of the doubt, and ask for a little further information before he utterly condemned them. Mr. Beard said in effect that the Gas Committee had sold gas which was worse in quality than that which the Companies supplied, and was also dearer in price. Now, as a matter of fact, the tests of a person who was perfectly impartial, being employed by the magistrates, did not show any deficiency whatever in the quality of the gas; on the contrary, they showed that it was improved under the management of the Corporation. That, he supposed, was so much the worse for the tests, because they did not agree with Mr. Beard's estimates. The Committee, according to Mr. Beard, were getting £105,000 a year more than the Companies had after they had paid their usual dividends and made a sufficient reserve. And Mr. Beard asked where was it gone to? What was the explanation of this sudden disappearance of £105,000 a year? There were only two explanations, and he offered them both to Mr. Beard, so that he might take his choice. The first explanation was that the Gas Committee were knaves and fools. The other explanation was that Mr. Beard was—well, that Mr. Beard was mistaken. Mr. Beard complained that the Gas Committee had grievously injured the iron trade of the district by not reducing the price of coke, but at the same time he had accused the Committee of giving the coke away. The Committee reduced the price of the coke quick enough to clear their yards when they became over-full. With regard to the leakage, Mr. Beard furnished some calculations which were not correct, and then he said this proved that he (Alderman Chamberlain) had made a misleading statement. Now, the official returns of the leakage were as follow:—In 1875 it was 10·5 per cent.; in 1876, 10 per cent.; in 1877, 9·8 per cent.; in 1878, 9·24 per cent.; in 1879, 8·5 per cent. Mr. Beard informed the Council that the Companies under their Acts could not have established sinking-funds. Certainly, there was no provision for it, but they laid aside large sums for depreciations whenever they made large profits, and were thus enabled to establish that which answered all the purposes of a sinking-fund. Dealing with other statements of Mr. Beard, Alderman Chamberlain said he did not complain that Mr. Beard amidst a mass of complicated figures, made mistakes, but he felt bound to remark that they all seemed to be mistakes on one side. Alderman Avery had pointed out that the Committee's present price for gas was only 2d. more than the lowest average price of the old Companies. If that were correct, while the Committee were losing 3d. upon the price of coal and coke, they were only charging 2d. of it to the gas consumers. He would move—"That the Committee be authorized to obtain tenders and enter into contracts for the construction of a new retort-house, new exhauster, and engine and boiler house, at the Windsor Street works, at an estimated cost of £75,000." At present they had ample powers for carrying on the works, but in about two years time there would be a deficiency, which would become a great one if there were any considerable improvement in trade. The completion of the extension of the works would probably last over two or three years, and if they were to be safe it would be necessary to commence the extension almost immediately. It was proposed to use the new houses all the year round, as they would be erected on a new system, and the present retort-houses on the older system would be used only as winter works, when a larger supply of gas was needed. As to the capital account, it was not desirable, he urged, to allow it to continue increasing more rapidly than they could help. When the Council first undertook the management of the gas supply, he pointed out that they might assume that, if the capital increased at the rate which the capital of the Companies increased, something like £70,000 per annum would be required in extra capital expenditure. They had, however, done much better than was anticipated in this respect, for in four years the capital was only increased from £2,000,931 to £2,153,336. If the reserve and sinking funds were taken from this amount, the total increase of the capital was only £36,000, or 1¾ per cent. in four years; while during the same period the maximum daily make (which was a test of the capacity of the gas undertaking) had increased from 14,700,000 cubic feet to 18,250,000 cubic feet, or 24 per cent. The present demand was for manufacturing power only, but sooner or later additional storeage would also be required.

The motion was agreed to, as were two others relating to the acquisition of additional land.

Alderman CHAMBERLAIN then proposed that the Gas Committee be authorized to make an application to the Local Government Board for sanction to borrow sums not exceeding £125,000 for the purposes of the gas department. This was purely a formal matter, as it merely gave the Committee the right to apply for the necessary parliamentary sanction to borrow. He brought forward the motion in the name of the Gas Committee, but he thought it was a pity to ask for so small a sum. The Committee could not spend a penny without the sanction of the Council, and as money would ultimately be required, he would accept an amendment that they ask to borrow £250,000.

Mr. MARRIS moved, and Alderman BIGGS seconded, that the application be for £250,000; which, after a short discussion, was agreed to.

Alderman CHAMBERLAIN next moved that the Committee be authorized to enter into agreements with the Local Boards of Oldbury, Smethwick, and Tipton, and the West Bromwich Improvement Commissioners, for the transfer to them of those portions of the gas undertaking within their respective districts.

Alderman HEATON asked if the costs of the arbitration were included in the law and parliamentary charges of £1639, and, if not, what were the charges estimated at.

Alderman CHAMBERLAIN said the charges of the arbitration were not included in the £1639, and no estimate had been made out; but there was not the least doubt they would be enormous.

The motion was agreed to.

Alderman CHAMBERLAIN next moved that the report be approved. The efforts made by the Committee to keep from all possible squabbles with the Local Boards were attended with ill success. There was a time when he regretted that they had any intention to separate from the Corporation of Birmingham. He thought it was a pity to break up the great concern, and he believed the Council might amicably provide for their requirements; but after the painful experience of the last four years he himself most devoutly wished that the time had come when the Boards separated themselves from the Corporation once and for ever. With reference to the proposed improved illumination of New Street, he remarked that only a few evenings previously the members of the Gas Committee, accompanied by the Chairman of the Public Works Committee, went to the works and saw a collection of improved burners, and in a short time the Committee would be prepared to carry out the experiments. He thought the Committee would find it desirable to alter the locality of the experiments, one of the reasons being that the footpaths in New Street were too narrow to admit of trials being successfully made. He believed that the best place for the display would be in front of the municipal buildings and in front of the Town Hall.

Mr. BEARD said Alderman Chamberlain had stated that he omitted to refer to coke when quoting his speech. The paragraph he referred to alluded to coal only. In 1875 the consumption of coal was 296,000 tons, and from that the Companies made 2579 million cubic feet of gas. In 1878 the consumption of coal was the same, and the statement went to show that the Committee had made more gas with the same quantity of coal. There was really no reference made to coke, and yet it was a fact that during the year 50,000 tons of coke were used in gas manufacture. He had made no mistake whatever in the statement. He had received information which showed that at Plymouth the present charge for gas was 2s. 2d. per 1000 cubic feet, to which must be added the meter-rent, which did not average more than 2d. per 1000 cubic feet. At Sheffield the total amount was 2s. 4d., and at Leeds, 2s. 3½d., while at Birmingham it was 2s. 7½d., showing an excess of 3d. or 4d. per 1000 cubic feet. He argued that there might be a reduction in the price, considering that there were greater facilities for obtaining coal in Birmingham than at Plymouth.

Alderman CHAMBERLAIN, in reply, said that Mr. Beard had read a quotation from his speech, "that in 1878 our price for ordinary coal, excluding cannel, was 9s. 6d.;" but the real quotation continued, "the value of 11 cwt. of coke was only 4s. 5d., and the net cost of a ton of coal was therefore 5s. 1d., or 2s. 8d. more than in the earlier period." He contended that Mr. Beard had ignored the quotation in its most important feature, and it was just as probable that, being incorrect in one thing, he was incorrect in the figures he had quoted regarding other towns.

The motion was then agreed to, and the Council proceeded to other business.

THE GAS SUPPLY OF LONG EATON.

BOARD OF TRADE INQUIRY.

The Long Eaton Gas Company having applied to the Board of Trade for a Provisional Order to enable them to raise £14,000 for the extension of their works, Major MARINDIN, R.E., one of the Board's Inspectors, attended at the Local Board Room, Long Eaton, on Tuesday, the 10th inst., to inquire into any objections that might be raised to the application.

Mr. B. BROWNE appeared for the Gas Company; Mr. EDDOWES opposed the application, on behalf of the Spondon, Ockbrook, and Borrowash Gas and Coke Company, and Trent College; Mr. G. CORBETT appeared for the Derby Canal Company; Mr. ACTON for Mr. T. A. Drennon, and owners of property, &c., who had memorialized the Board of Trade; and Mr. BLACK represented the Long Eaton Local Board.

The INSPECTOR having formally opened the inquiry and viewed the works,

Mr. BROWNE addressed him in support of the application. He said he asked for a Provisional Order to enable the Long Eaton Gas Company to construct additional works and make and supply gas. The Company were formed in 1864 with a small capital, but up to that time the gas had been made by a Mr. Bush as a private speculation. The Company consisted of large consumers. The works were continued up to 1872, when it was found that an extension was necessary, and the Company increased their capital to £8000. In 1877 their works were again found to be insufficient, and they purchased some ground and erected another gasholder. Since then they had gone on increasing, and in 1879 it was found expedient again to extend their works, which were now employed to their full capacity The Inspector would hear that gas was absolutely necessary for the manufacture of lace, which was carried on to a large extent in Long Eaton, and it was clear that as the place grew, more gas would be required. The Company, knowing this, thought that in extending their works they ought to place themselves under parliamentary control. As they now stood they could supply gas of any quality and at any price, or they could refuse to supply any one; but if they were under parliamentary control they would be obliged to supply good gas and at a moderate rate. He contended, therefore, that the extension of the works would be to the interest of the consumers. In the past there had not been a single objection raised to the quality of the gas; and, although there had been complaints about the price, he should be able to prove that it was supplied at a reasonable rate. No one would dare to say that the Company had worked badly, or squandered their capital. At one time the Local Board were anxious to purchase the works, but made the Company an offer which was altogether inadequate. With respect to the new site, he considered that a better place could not have been selected; but the Inspector would probably hear what was to be said in opposition to it. It was alleged that four or five little houses would be seriously affected by the manufacture of gas being carried on, but he did not think such would be the case. The site was high up, so that it could not be affected by the floods, and, besides this, the Company would have the great advantage of being close to the railway sidings, so that they would be able to get their coals at a cheaper rate, and the consumers would therefore be benefited. The gasholder had been on the site since 1878, and, so far as the Company knew, no one had complained. It was true that Mr. Drennon wrote to the Company, complaining of the existence of the holder, and legal proceedings had been threatened; but, of course, nothing came of it, and, with this exception, there had not been a single complaint until the memorial recently submitted to the Board of Trade. The necessity for an extension of the gas-works had been admitted at all the public meetings which had been held on the subject. The people of the town, ratepayers, and the Local Board considered the site well chosen, and it seemed to have given general satisfaction except to a few persons residing in Union Street. The only reason the Local Board had withheld their consent up to the present time was because they had proposed that the works should pass into their hands; but they did not now attend to oppose. They held a meeting on Dec. 23, 1879, and a motion was then made that the Order should be opposed, but the proposal could not find a seconder. Other meetings were held, but nothing was done, the Board only complaining of the Company's monopoly. The Local Board eventually held a meeting, at which they decided not to oppose the Company, and although he would admit that five out of the twelve members were Shareholders in the Company, those five refrained from voting. With regard to the outlying districts, the Company proposed to go to Sawley, and also supply those places which the Ockbrook Company had been promising to supply for some time, but had not yet reached. The Order, he contended, was not in favour of the Company, but of the town. The Company would be bound to supply a good quality of gas, be open to an inspection of their works at any time, and, besides all this, would be

liable to a very heavy penalty if their works caused any nuisance; so that instead of Mr. Drennon being worse off by the new works he would be protected. Respecting the memorial put in by Mr. Acton, he might say that there were 600 owners and occupiers within 300 yards of the new site, and yet only 57 of these had been induced to attach their signatures. Further than this, there were some who signed but had since changed their minds, and who were now anxious to remove their names from the memorial. He considered Mr. Drennon very inconsistent, because although he told the Board of Trade that it would be a good thing for the gas-works to be placed in the hands of the Local Board, he at the same time was a Shareholder in a new Company which had started in rivalry to the present one.

Mr. CORBETT said, as the representative of the Derby Canal Company, he wished to state that he did not desire to oppose the Order, but was only present to ask the Company to use all necessary precautions in taking the gas over the bridges of the Canal Company, so that no damage might be caused.

Mr. BROWNE said the Canal Company need have no fear of any injury being done to their bridges, because the Gas Company were bound by law not to do any damage, and it was to their advantage to lay their mains properly.

Mr. Corbett's opposition was, therefore, withdrawn, as was also that of Trent College.

Mr. BROWNE then called Mr. *Blythen*, Secretary to the Long Eaton Gas Company, who said he had been in the Company's service since 1870, and during that time had watched the manufacture of gas. He believed the Company had done their duty to the consumers, and that the site proposed was the best that could be obtained. He had not had any complaints of the quality of the gas, but had had complaints as to the price. The residents in Union Street had not objected to the site.

In answer to Mr. ACTON, he said there had been many complaints of the price of gas. The average price was 4s. 2d. per 1000 feet, but some consumers paid 5s. For the last five years the Company had paid a dividend of 10 per cent., and during that time had increased their capital £300 or £400. Mr. Fletcher, the Chairman of the Local Board, was a Shareholder in the Gas Company, having about 100 shares.

Mr. *Charles Taylor*, Resident Engineer of the Derby Gas Company, and Manager of the Long Eaton Gas Company, examined by Mr. BROWNE, said he knew the Long Eaton Gas Company proposed to increase their capital, and he considered it was quite necessary. The gas supplied had been of very good quality, and there had been no complaints. He believed the site chosen to be a very suitable one, and the gas could be sent from there much cheaper than if the works were taken farther away. He did not think they would be injurious to health and property, and was quite satisfied that gas could be manufactured without causing a nuisance.

By Mr. ACTON: The proposed price is 5s. 6d. per 1000 cubic feet.

Mr. BROWNE objected to any question being put to the witness on the point of price, as no objection as to that had been sent to the Board of Trade.

The INSPECTOR was of opinion that, under the circumstances, Mr. Acton had no right to go into the question of price.

Re-examined by Mr. BROWNE, witness said he considered 5s. 6d. per 1000 feet a fair standard price, but he also thought that if coal became cheaper the Company would be able to supply gas at 5s. per 1000 feet.

Mr. *C. E. Jones*, Engineer of the Chesterfield Water and Gas Company, examined by Mr. BROWNE, said he had examined the plans and the site proposed, and he considered the latter well chosen. He did not think the works would be injurious to the surrounding property, and he knew many instances where valuable property was built round gas-works. He did not think 5s. 6d. per 1000 feet for Long Eaton, and 6s. 6d. per 1000 feet for the outlying districts, was an excessive price for gas. He never knew gas-works to be injurious to health.

Mr. EDDOWES addressed the Inspector on behalf of the Spondon, Ockbrook, and Borrowash Gas Company, who opposed the Order. He said the Company were started in 1868. In 1877 it was proposed to extend the works, and their Engineer was instructed in the matter. It was intended to supply some villages which the Long Eaton Company now proposed to supply, and the greater portion of the mains were laid into the village of Draycott. He also produced a resolution passed by the ratepayers of Draycott, to the effect that they rejected the proposal of the Long Eaton Gas Company to bring gas into Draycott. He contended that the Spondon Gas Company were able to supply the neighbourhood without the Long Eaton Company taking any steps in the matter.

Mr. *Stevenson*, Secretary of the Spondon Company, was called, and, in answer to Mr. BROWNE, said the Company were not bound to supply any one with gas, and could charge what price they pleased. If the present Order were rejected, the Spondon Company would not care about supplying Sawley, which would, therefore, have to remain without gas.

At the request of Mr. ACTON, Mr. *Blythen* was recalled, and said there was other unoccupied land close to the site the Company now had, but he was not aware that it could be obtained.

Mr. ACTON then stated his objections to the Company's application, which were that the proposed works would be injurious to the surrounding property and to health; but he added that, in consequence of his clients having neglected to lodge an objection as to the price of gas, he was unable to go into the most important question. He suggested that the more important site should be obtained, but if that were not done, the purifying-house, which was so near Mr. Drennon's house, should be removed to a more convenient place.

Mr. BROWNE having replied,

The INSPECTOR closed the inquiry, stating that he would submit his report as soon as possible to the Board of Trade.

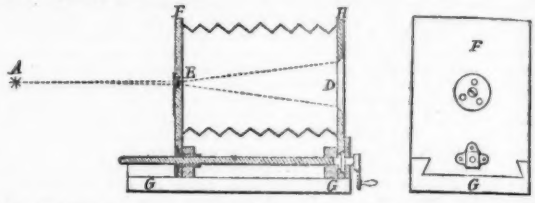
A PHOTOMETER FOR INTENSE LIGHTS.

In the JOURNAL for Dec. 30 last, page 1018, we gave a short notice of a paper, on "A Dispersion Photometer," read by Mr. John Perry, one of the authors—Mr. W. E. Ayrton being the other—before the Physical Society, on Saturday, Dec. 13. The Authors have since favoured us with a copy of the paper. It is as follows:—

In measuring what is usually termed the power of a light, it is common to have a screen placed at such a distance from the light that its illumination is equal to that which it or another screen receives from a standard candle. Now, if a standard candle is, say, 1 foot from a screen, an electric light of, say, 6400-candle power must be placed at the distance of 80 feet from a screen to give the same illumination. That a great distance like this should be necessary, and in a chamber whose walls are supposed to be blackened, in the laboratories of works where electric lights are usually examined, has placed great difficulties in the way of exact determinations of the powers of lights. Our experience in experimenting with electric lights leads us to believe that, but for this difficulty, we should have a vast body of information on the subject of electric lighting, instead of the vague and conflicting statements which fill the scientific journals. Perhaps only those who have made experiments will appreciate fully the great advantages of our having some compact form of photometer. The members of the Society will no doubt see many applications of a compact photometer, such as measuring the light from various parts of the sky, for instance, in which ordinary photometric methods are unavailable. Now, our instrument will resemble a camera, and it may be turned in all directions.

We were delighted to hear from Dr. Guthrie that his principle of a "retention-image photometer," recently communicated to the Society, has proved to be correct quantitatively. The success of his test must be as interesting to physiologists as to physicists. Besides testing his principle by using powerful lights, he will have experiments to make concerning the loss of light in reflection, as we shall have concerning loss in refraction. Probably, however, he does not intend to apply his instrument to powerful lights, on account of the very great difficulty he would meet with in measuring the breadth of the fine slot which would be needed.

In ordinary photometric methods, the rays of light illuminating unit area of screen, if coming from a powerful source, are contained in a very small solid angle. We use the very simple expedient of causing these rays to fill a much greater solid angle by passing them through a thin concave lens, and in this way obtain the same amount of illumination as before, but on a screen placed at a short distance behind the lens. Thus we not only save space, but prevent a great deal of the absorption which occurs when light passes through air. This absorption is sometimes very great in London. We have, however, absorption in the lens as a disadvantage; but with a very thin lens this may probably be reduced to an almost inappreciable amount.



A is the light to be measured; D is a paper screen illuminated by light passing through the concave lens, E. The frame, F, which carries the lens, slides on a stand, G, which has marked divisions, so that a pointer tells the distance from the focus of the lens to the screen, D. The sides of the space, F H, are of black cloth, like the sides of a folding camera; and the inside is all blackened except the screen, D. A circular plate with three round holes of different sizes is in front of the lens. A diaphragm of this kind is not necessary if we can be assured of there being no reflection from the inside of the box. Beside the instrument, and containing the standard candle, is a box blackened inside, in one end of which is a screen similar to D. If D is the distance from the light to the lens, and d is the distance from the principal focus of the lens to the screen; if δ is the focal length of the lens, then, roughly, a bundle of rays of unit solid angle gets to have, after refraction, an angle $D^2 \div \delta^2$, as D is always great in comparison with δ. If L is the total light, then the unit angle of incident rays and the unit angle of refracted rays have amounts of light

$$\frac{L}{4\pi} \text{ and } \frac{L}{4\pi} \cdot \frac{\delta^2}{D^2};$$

so that a screen at the distance d from the focus of the lens has illumination of the intensity

$$\frac{L}{4\pi} \cdot \frac{\delta^2}{D^2} \cdot \frac{1}{d^2}.$$

If, now, another screen has the same illumination from a candle of which the total light is unity, at the distance D_1, this illumination is

$$\frac{1}{4\pi D_1^2} = \frac{L}{4\pi} \cdot \frac{\delta^2}{D^2} \cdot \frac{1}{d^2};$$

and hence

$$L = \frac{D^2}{D_1^2} \cdot \frac{d^2}{\delta^2}.$$

A double concave lens, of focal length 1 centimètre, being employed, and d being capable of variation from 40 to 10 centimètres, and D being as much as five times D_1, we can measure in a very small space a light which is from 40,000 to 100 times the standard candle.

We propose to make careful experiments on the absorption in passing through the lens; and by interposing thin plates of glass between the standard candle and its screen, to produce there a similar absorption, we have no doubt measurements may be made with this instrument with much greater accuracy than is possible by the ordinary method.

The power of the light is practically, therefore, proportional to the square of the product of the measurable distances. It will be, of course, unnecessary to measure the variations both in D and in d, as the scale can be so graduated as to give both distances at one reading.

THE WATER SUPPLY OF CHAPELTOWN, NEAR SHEFFIELD.—The question of providing an adequate supply of water for the parish of Chapeltown, which has been before the public for several years, has (says the *Sheffield Independent*) just been brought to a successful issue. Under the provisions of the Public Health Act, the Sanitary Authority (the Guardians of the Wortley Union) were charged with the duty of providing a sufficient supply of water for their district, which included the parish of Chapeltown. The matter continued to occupy the attention of the Authority, and they, in 1875, made an application to the Sheffield Water Company for a supply. In reply, the Company, through their Manager, stated that they were prepared to furnish a supply of water for Chapeltown at the rate of 70,000 gallons per day, at a cost of 7½d. per 1000 gallons. In order to carry out their part of the scheme, the Sanitary Authority applied to the Local Government Board for sanction to borrow £5000 from the Public Works Loan Commissioners, and an inquiry was held. Shortly after the inquiry, the Sanitary Authority obtained the consent of the Board to borrow the money, and the work was soon after commenced. The scheme is now completed, the water having reached Chapeltown a few days ago. A good deal of discussion has taken place amongst the ratepayers as to whether all persons will be compelled to take a supply from the mains, and all ratepayers be compelled to pay water-rates, whether they have water or not. In reply to a communication on these points, Major Tulloch, one of the Local Government Board's Inspectors, states that "every person, being a ratepayer and residing in the district, will be charged with a rate for the repayment of the loan; but in case any person has a good supply of water, he will not be obliged to take a supply from the mains. If, however, the Sanitary Authority consider that any property is inadequately supplied, they may compel the owners or occupiers of such property to take a supply."

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Throughout the coal trade generally of this district there seems to be the most discouraging prospect with regard to the immediate future. As I pointed out some time ago, there is every probability of all classes of round coal, and the better classes especially, being exceedingly plentiful during the ensuing summer, and already prices in many cases are quite as low as they were last summer. House-fire classes of fuel are naturally in less demand, and as the production of these during the winter has been quite, if not more than equal to the demand, there are heavy stocks on hand, and holders are willing to sell, at least over the summer, at lower prices than those which have recently been ruling. With regard to the lower classes of round coal, the improved demand for iron-making purposes has been altogether outweighed by the largely increased production, and I hear of large consumers in the iron trade being able to buy over the next nine months at very low figures. The only class of fuel that shows any signs of revival is slack, which is in considerable demand for engine purposes, consequent upon the improvement in the cotton trade, and as there is a probability that supplies will be scarce as the summer advances, prices have a tendency to harden, slight advances being already obtained in some cases. The average quotations at the pit mouth are about as under:—Best qualities of Wigan Arley, 8s. to 8s. 6d.; common, 6s. to 6s. 6d.; Pemberton four-feet, 6s. 3d. to 6s. 9d.; common round coal, 5s. 3d. to 5s. 9d.; good slack, 3s. to 3s. 6d.; and common about 2s. 6d. per ton.

Coke continues in good demand, and firm at about the prices quoted last week.

The shipping trade has been very dull, and with the large quantity of coal now offering in the market, sellers are obliged to take very low figures to secure orders.

In the iron trade there is still only a moderate demand from local consumers, most of whom, with the exception of some of the forge proprietors, appear to be well covered for the present. A very fair inquiry for export is, however, maintained; and as there is an expectation of a brisk trade being done when the spring shipping season opens, makers, as a rule, are very firm in their prices, and it is only second-hand iron that can be bought under late rates. Lancashire makers of pig iron are still well sold, so far as their present production is concerned, and for delivery into the Manchester district their quotations remain at about 70s. per ton, less 2½ per cent. Finished iron is without material change. The forges continue very busy, and for delivery into the Manchester district quotations remain at £9 to £9 10s. for bars, to £10 5s. to £10 10s. for hoops.

In other branches of trade the improvement is only slow, but some of the large engineering and machine-making firms in this district are pretty full of orders, and are asking higher prices.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The weather was stormy in the North Sea last week. There was much delay in the arrival of coasting, over-sea, and collier steamers. The shipments fell short. There is a good supply of coasting sailing tonnage; there are more small sailing vessels than there are orders. Most of the vessels employed in the sea-borne gas coal trade are known as "gas-house ships," and, as a rule, belong to the gas companies in the eastern counties, or ports in the British Channel. Hence very little shipping business for the conveyance of gas coals is arranged for in the open market. The gas coal trade is firm. All the best Durham collieries are busy. The output of some of the Durham gas pits is about to be increased by opening seams which have not been wrought hitherto. The Baltic business will open in about three weeks, and there will be extensive shipments of gas coals for the large Russian gas-works immediately following. The contracts for gas coals seem to have been made up for the season. Little or no fresh business has been entered upon over the past week or ten days in that direction. The shipments of gas coals to the Mediterranean are not very large at present. The steam coal is doing very well, but house coals are in little demand. The small and manufacturing coal trade is firm. The local demand improves every week, and prices are better. The coke trade is very strong, recent advances being fully sustained. The demand is better than it has been for the past three or four years. The make is increasing in quantity. Fresh ovens are being built in various parts of the Durham district.

The freight market is quiet. Coasting rates keep low. There is not any probability of an advance in freights coastwise this spring, not even after the Baltic trade is opened. The figure for London is about 4s. 3d. steamers, and 5s. 6d. to 5s. 9d. sailing vessels. Channel rates are equally low.

The iron trade of the Cleveland district showed some improvement last week. The blast-furnaces and rolling-mills are busy, as a rule. The foundries, too, are very full of work.

The fire-brick trade, as I have already reported, is active. Prices have been advancing steadily since Christmas. A large quantity of fire-bricks and fire-clay goods will be shipped from the Tyne this week for the Continent.

The lead market is quiet. The inflation of prices in the timber trade, which arose out of speculative transactions about Christmas, has collapsed. The demand which was expected has not arisen, and recent sales have been made at more moderate prices, and somewhat in proportion to the consumptive demand. The chemical market, too, is void of speculation. A quantity of chemicals were bought a month ago for delivery in March. The shipments, from the amount of tonnage which has been taken up, will be large that month, especially to the United States.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The arbitration case connected with the acquisition of the gas supply undertaking of Wishaw by the Police Commissioners of the burgh, under the Burghs Gas Supply (Scotland) Act, seems to have got into a condition of suspended animation. So far as I can learn, the arbiters have not held a meeting for many months. They are—Mr. G. R. Hislop, Paisley Corporation Gas-Works, for the Gas Company; and Mr. B. M. M'Crae, of Dundee, for the Commissioners; with Mr. A. Smith, Aberdeen Gas-Works, as the oversman. Judging by the apparently entire absence of action on the part of the arbiters, or of the parties on whose account they were chosen to act, it can scarcely even be said that the case "drags its slow length along." And the Elgin case does not seem to be doing much better. In this case the arbiters are—Mr. Hislop, for the Gas Company, and ex-Provost Robertson, of Dundee (an engineer), for the Town Council—Mr. W. Foulis, Engineer to the Glasgow Corporation Gas Commissioners, being the oversman. It seems that the gas-works were opened in April, 1831, and that in June of the following year a dividend of 4 per cent. was paid to the Shareholders. The annual dividend remained at that rate for some years. Then it was raised to 5 per cent., and subsequently to 6 per cent., and it is stated that latterly 7 per cent. has been paid on a nominal capital of £9935 10s. There are 621 shares of the nominal value of £16 per share. I understand that the Town Council offered, in the early history of the negotiations, to pay the Gas Company at the rate of £17 10s. per share, but the offer was declined, and the price asked was a lump sum of between £23,000 and £24,000. It is stated that the delay in the arbitration was caused by the reluctance of the Gas Company to allow their minutes and statement of accounts to be put into process, as had been requested on the part of the arbiter for the town. The request, however, has now been complied with.

At the last meeting of the Greenock Police Board, Bailie Paul drew attention to the fact that Mr. Stewart, the Manager of the gas-works, had asked that regulators and meters be put on the public lamps, so as to ascertain whether or not they were burning more than was calculated on or was allowed for; and he (the Bailie) suggested that, in addition, large meters should be put down in sectional parts of the town, so as to find if any section burned more gas than another. They would thus discover the more readily in what district of the town the waste complained of took place. Bailie Shankland, the Convener of the Gas Committee, said the Provost highly approved of Bailie Paul's suggestion as to the use of district meters in endeavouring to discover where the waste of gas occurred, and he had no doubt that it would be attended to by the Sub-Committee.

The Directors of the Gourock Gas Company have resolved to extend their gas-works by the erection of a new and enlarged telescopic gas-holder, retort-house, and station-meter. The alterations and extensions, which are to be carried out during the ensuing summer, will probably cost about £2000.

A meeting of the Gas Corporation of Forfar was held on Monday, the 16th inst.—Provost Lowson in the chair—when reference was made by Bailie Laird to the borrowing powers of the Gas Corporation, the purchase of annuities, and the propriety of obtaining a Provisional Order giving power to borrow up to £8000 or £10,000. It was ultimately remitted to a Committee to inquire as to the expense of obtaining a Provisional Order, and to report.

Active measures are about to be taken to carry out water supply works for West Kilbride, in Ayrshire, and for Bothwell, in the Middle Ward of Lanarkshire. The plans of the works in both cases have been prepared by Messrs. Leslie, Civil Engineers, Edinburgh.

A very extensive business was done daily in the Glasgow pig iron market last week, the price ranging from 70s. 10½d. cash on Monday, to 67s. 1½d. on Friday. Up to 67s. 9d. was paid before the close on Friday afternoon. Many weak holders have now cleared out, and the market is on a pretty solid basis.

The coal trade is becoming so dull that wages are beginning to decline, and a difficulty is experienced in a number of instances to find continuous work for six days a week.

THE MALTON GAS COMPANY'S BILL.—In the last issue we noted that at a meeting of ratepayers called to decide as to whether or not the above-named Bill in Parliament should be opposed by the Local Board, a poll was demanded. This was taken, and the result announced last Tuesday. There are about 2000 ratepayers in the borough, and about 1500 voting-papers were issued. The result showed—For opposition, 1245; against, 120; majority, 1125.

THE WATER SUPPLY OF HORNSEA, NEAR HULL.—The Local Board of the favourite South Yorkshire watering-place of Hornsea have recently completed the construction of water-works at a cost of more than £9000. The bore of the well which has been sunk is about 300 feet deep, 12 inches in diameter, and penetrates a considerable distance into the rock, yielding a plentiful supply of water of excellent quality. The pumping tower is erected on the north side of the town, on Ley's Hill, the site being 70 feet above the level of the sea. The tower is 40 feet high, with a tank on the top capable of holding 60,000 gallons of water. The mains are already laid throughout the town.

PONTEFRACT GAS COMPANY.—The half-yearly meeting of this Company was held on Thursday last, when the Directors presented a report in which they stated that the amount divisible among the Shareholders was £1882 19s. 9d., out of which they recommended the payment of a dividend for the half year ending Dec. 31, 1879, at the rate of 10 per cent. per annum. From the accounts it appears that the total expenditure on revenue account for the six months amounted to £1251 6s. 1d., while the receipts were £1899 19s. 4d. from sale of gas, £78 6s. 11d. for rental of meters, £355 12s. 9d. for residual products, and £4 5s. for rent., making a total of £2338 3s. 5d. There were 1151 tons of coal carbonized, which cost, including carriage, £527 17s. 11d. The total share and loan capital of the Company amounts to £17,300, and there has been expended on capital account to date £2832 more than this.

BROMSGROVE GAS CONSUMERS COMPANY, LIMITED.—The eleventh ordinary general meeting of this Company was held on Monday, the 9th inst.—Mr. W. Jefferies in the chair. The report of the Directors, recommending a dividend for the past year at the rate of 10 per cent., was adopted. The balance-sheet showed a profit of £985 1s. 8d., of which the dividend will absorb £900, leaving £85 1s. 8d. to be carried to the reserve-fund, making that fund £562 1s. 4d. Messrs. Bennett and Saywell, the retiring Directors, and Mr. F. N. Gosling, the Auditor, were re-elected; and a sum of £70 was voted to the Directors for their services during last year, and the like sum for each succeeding year, the amount to be divided *pro ratâ*, according to attendance. Votes of thanks were passed to the Directors, to Mr. H. Wright (the Secretary), to the Auditor, and to the Chairman.

LONGRIDGE GAS COMPANY.—The annual general meeting of this Company was held on Saturday, the 14th inst.—Mr. D. Irvin in the chair. The accounts presented showed that on Dec. 31, 1878, there was a balance of £480 6s. 1½d., which, added to miscellaneous receipts during 1879, £110 3s. 11½d.; gas and meter rents, £795 12s. 2½d.; and interest and commission account, £4 12s. 3d., made a total of £1390 14s. 6½d. The payments for 1879 were—Dividend, £287 17s. 2d.; dividend warrant not presented, 5s. 1d.; cost of Provisional Order, £180 16s. 3d.; amount appropriated to reserve-fund, £11 7s. 7½d.; salaries and wages, £142 1s. 6d.; cannel, coal, and lime, £185 4s. 0½d.; rates, taxes, and sundries, £119 2s. 9d.; leaving a balance of £464 0s. 1½d. The Directors proposed to pay a dividend of 6 per cent., and carry the balance to the reserve-fund. The Chairman, in moving the adoption of the accounts, said he had pleasure in meeting the Shareholders, especially so when they were able to pay a dividend of 6 per cent. The Company had passed through a period of great commercial depression, but he was happy to say the Directors had, by good management and strict economy, secured a result which he thought would please them all. The motion was carried unanimously. The Chairman moved that a dividend of 6 per cent. be paid, and it was carried. The retiring Directors (Messrs. R. Walne, J. Walne, and R. Howarth) were re-elected. Votes of thanks to the Directors and the Secretary (Mr. R. Booth) for their services, and to the Chairman for presiding, terminated the proceedings.

NORMANTON GAS COMPANY.—The half-yearly general meeting of this Company was held on the 7th inst. The Chairman (Mr. W. Statter) said so far as the works were concerned, he had to report that they were in

good order, and the Directors thought they should not have to lay out much more on account of capital. Last year they expended £508, but they thought that another £100 would cover all they would have to lay out at present. The principal item had been the new scrubber, which had produced a considerable increase in the quantity of ammoniacal liquor, and their residuals account had been proportionately made larger. Last year their three years contract for the supply of gas to the Normanton railway station expired, and he had the satisfaction to inform the Shareholders that they had renewed the contract for the same period. The amount of leakage was rather against them, being 19 per cent., which was about double what it ought to be. But in all districts where coal was worked the leakage of gas was serious, owing to the ground constantly giving way below the mains. Their revenue from the sale of gas was somewhat diminished—£77 less than it was twelve months before; but the Shareholders must bear in mind that they had lowered the price of gas 4d. per 1000 feet. They had really sold more gas by 100,000 feet, which, though not much, was better than if the difference had been in the opposite direction. But while their revenue from gas had been £77 less, their residuals account was over £100 more, which was to be accounted for by the circumstances he had already mentioned. The total expenditure for the half year, in the production of the gas, &c., was £759 15s. The sale of gas in the ordinary way produced £487 19s. 7d., and by contract £742 7s. 5d., making a total of £1230 7s. Residuals had realized £265, against £137 last year, which, with other small items added to the revenue from gas, made a total of £1532 19s. 8d. This left a profit of £773 4s. 5d., as compared with £730 last year. It required £750 to pay their ordinary dividend of 7½ per cent., so that after paying that dividend they would have £23 4s. 5d. to carry to the reserve-fund. Last half year they had to dip into the reserve-fund to pay the dividend, instead of adding to it, as they were doing this time. This fund would now stand at £1099. The accounts were then adopted, and a vote of thanks to the Chairman and Directors terminated the proceedings.

Register of Patents.

4288.—Snuggs, E., Windsor, "*Improvements in water-taps.*" Patent dated Oct. 25, 1878.

This invention relates to improvements on patent No. 2959, Oct. 12, 1869, and consists in substituting a quick-set screw, working in a moveable cap, for raising and depressing the plug, in place of the lever, and instead of a solid plug and shaft, a plug and central shaft revolves or rises and falls within a brass cylinder, around which is placed, when the tap is a cold-water tap, leather discs dressed with oil and French chalk, in order to resist the action of the water, and to diminish friction at the same time that it renders it impervious to the action of frost.

4290.—Gale, G., New Wortley, near Leeds, "*Improvements in the means or apparatus for igniting, regulating, and extinguishing the lights in street and other lamps.*" Provisional protection only obtained. Dated Oct. 25, 1878.

These improvements consist in pneumatic apparatus attached to the taps of gas-lamps, so that by exhausting or drawing off the air from the apparatus the light may be reduced to any height, or entirely extinguished, and by the admission of air into the apparatus the gas may be ignited or adjusted, or *vice versâ*. The pneumatic apparatus is worked by an air-pump or other convenient means.

4309.—Brunton, J., Westminster, "*Improvements in sluice-valves or sluice apparatus.*" A communication. Patent dated Oct. 26, 1878.

In this apparatus, a counterbalanced lever with a segmental arch head at each end, and in length suited to the extreme variation of "head" that the water will undergo, is supported by a spindle in the centre. Attached to one head is a float and a chain, which passes to a winch, so as to cause the lever to turn on its pivot. The sluice-valve plate is attached to rods that are acted upon by a cam surface on the lever. By this means an equal discharge of water may be obtained in a given time, no matter how the head of water varies.

4312.—Johnson, S., Wood Green, London, "*Improvements in apparatus for preventing waste of water in water-closets, urinals, lavatories, and other situations where intermittent supplies of water are required.*" Provisional protection only obtained. Dated Oct. 26, 1878.

To carry out these improvements, a syphon-pipe is placed in a cistern containing water not quite rising to the bend in the syphon, so that by plunging a block into the water the level is raised, and the water passes down the syphon tube into the water-closet until the end of the shorter leg of the syphon is uncovered.

4333.—Orme, D., Oldham, "*Improvements in wet gas-meters.*" Patent dated Oct. 28, 1878.

In constructing a meter according to this invention, an ordinary float and valve are used at the inlet end or side of the meter, and at the front or back of the meter a compensating float of a semi-cylindrical or hemispherical form is placed. This float will descend into the water as it evaporates, and by so doing will maintain the water in the case at an uniform level, or nearly so. The meter is constructed so that the inlet pressure of gas will be on the water both in the front and back parts. The gas passes from the inlet valve into the body of the meter and into the measuring drum by the openings at the back, and after being measured is conducted by a bent pipe extending from the space within the cover of the drum to the outlet of the meter.

4352.—Cutler, S., Millwall, "*Improvements in gas-valves, and in the arrangement of the pipes connecting them with the vessels with which they may be employed.*" Application dated Oct. 29, 1878. (Void by reason of the patentee having neglected to file a specification in pursuance of the conditions of letters patent.)

This invention consists in forming a hollow vessel or chamber closed on all sides, and from the bottom of which and within it rise as many pipes as there are inlets to the valve. These pipes extend to about half the height of the vessel, and are connected at their lower portions to the respective mains over which the valves have control. Each pipe is covered by a bell or cylinder closed at the top, and capable of being raised above the mouth of the pipe. Each of these bells may have fixed to it a central vertical rod, which extends downwards through a guide to the bottom or near the bottom of the pipe, and upwards through a stuffing-box in the top of the chamber, the upper part of the rod that protrudes being screwed or having a rack attached to it. On the top of the outside of the vessel is a frame through which the screwed ends or racks of the rods pass, each rod being furnished with a nut and hand-wheel, or a pinion wheel and handle, so as to raise or lower the bell over its corresponding pipe. In the upper part of the chamber is formed an orifice which serves as an outlet. The chamber being partially filled with liquid, and all the bells down, on gas attempting to pass from any of the inlets into the chamber, it will be unable to do so, the bells being sealed in the liquid; but on raising any one or more of the bells above the surface of the liquid, a free way will be offered to the passage of the gas, and it will pass to the outlet without obstruction. In order to prevent any sudden check to the flow of the gas when closing the valve, and as a means of regulating the flow, the bottom edge of the bell may be formed with deep serrations, so as gradually to reduce the area of the gas way, and in like manner increase it when opening the valve.

4353.—Imray, J., Southampton Buildings, London, "*Improvements in the treatment of ammoniacal liquor for the separation of ammonia compounds therefrom.*" A communication. Patent dated Oct. 29, 1878.

In carrying out this invention, the ammoniacal liquor is placed in a vessel, and to it is added a quantity of calcium chloride, proportioned to the quantity of water in the liquor, and the contents are well mixed by stirring. There is then added a small proportion of either chloride of iron, or of chloride of iron and calcium, or of sulphate of iron. When sulphate of iron is used, it is suspended in the liquid in a bag of open fabric. After allowing the mixture several hours to settle, the upper portion is run off by the cock into a flat evaporating vessel of iron plate, heated by the waste heat of the furnaces. It is of advantage to put into the evaporator a small quantity of the double chloride of ammonium and lead, as this furnishes (by deposit of lead) a protecting surface on the interior of the evaporator, rendering the use of lead lining unnecessary. The liquid in the evaporator is then concentrated to any desired degree.

4423.—Johnson, J. H., Lincoln's Inn Fields, London, "*Improvements in pumps or apparatus for raising liquids.*" A communication. Patent dated Nov. 1, 1878.

This invention consists in raising liquids by the employment of pumps or apparatus operating by pulsations under the action of steam intermittently supplied at one side of a flexible diaphragm in a suitable chamber; while at the opposite side of the diaphragm is drawn or admitted the liquid to be raised. The pump or apparatus is provided with valves all arranged in combination one with the other and with the diaphragm.

4514.—Wright, W., Herne Hill, London, "*Improvements in valve apparatus for regulating or controlling the supply and discharge of water or other fluids.*" Patent dated Nov. 7, 1878.

In this apparatus, at the end of the supply-pipe over the cistern is a small cylinder which forms a continuation of the pipe, and presents its mouth downwards, so that the water will be discharged into the cistern when the valve is open. The interior of the cylinder is rounded at the upper end, and forms a seat for a ball of flexible material, which, when pressed tightly to the seal, closes the aperture leading from the supply-pipe, and prevents the flow of any water.

4525.—Chandler, S., Newington Causeway, London, "*Improvements in the construction of apparatus used in the manufacture of gas.*" Provisional protection only obtained. Dated Nov. 8, 1878.

This invention has special reference to the method of construction of apparatus mentioned in patent No. 4928, Dec. 29, 1877. [See Journal, Vol. XXXIV., p. 443.] In that patent it was proposed that "annular plates" should be connected together, leaving spaces between for the gas to pass through, the objection to this being the inconvenience of having to remove a very considerable portion of the machinery to get at even one set of annular plates, besides irregularity in the spaces. The patentee in consequence devised a plan of forming the spaces by means of segments of material being bolted together in blocks, leaving narrow spaces for the gas. They are made taper, slide into a frame, and are secured to a cross-bar at the lower part, and bolted to either side of the frame at its upper part. Thus when the whole of the segments are placed in the frame, annular plates will be formed, although not connected together as described in the former patent.

4539.—Preston, F. P., Prestige, J. T., Preston, E. J., Fowler, J. A., and Simmons, W. G., Deptford, Kent, "*Improvements in apparatus for measuring, regulating, controlling, and arresting the flow of fluids.*" Patent dated Nov. 8, 1878.

This apparatus consists mainly of a cylinder with a piston working therein, and fixed on a hollow piston-rod, or trunk, or tube. The piston may be made with an easy fit and without packing, or it may be provided with cup leather or other packing, and there is a small passage (which may be made adjustable by a cock or valve) communicating with both sides of the piston, but by preference the communication is made by a small aperture through the piston, and having a plug loosely fitting through it. The tube or piston-rod seats itself at one side against a valve, which is actuated by a screw or lever, or other suitable appliance, and at the other side it is open to the outlet. When the valve is withdrawn from the end of the tube, the water can pass to the outlet through the tube, the latter with its piston gradually receding from the end of the cylinder, while fluid passes from one side of the piston to the other, until the tube seats itself against the valve again.

4585.—Haddan, H. J., Strand, London, "*Improvements in purifying and increasing the light power of illuminating gas.*" A communication. Patent dated Nov. 12, 1878.

This invention consists, first, in purifying illuminating gas by passing it through bone-black or animal charcoal, whereby sulphur and ammoniacal compounds, and so forth, are separated from the gas; secondly, in carburetting gas by passing it through bone-black or animal charcoal which has been impregnated or saturated with hydrocarbons.

4700.—Miller, A. and A., Glasgow, "*Improvements in the manufacture of illuminating gas, and in the utilization of the impure products resulting therefrom.*" Patent dated Nov. 19, 1878.

This invention was fully described and illustrated in the Journal for Sept. 30 last [Vol. XXXIV., p. 514].

4727.—Lowry, G., Salford, "*Improvements in rotary engines, pumps, blowers, and meters.*" Patent dated Nov. 21, 1878.

In carrying out this invention, a cylindrical casing is formed with passages to convey the fluid to and from the apparatus, and fitted with end plates, in which a central shaft revolves. This shaft carries a crank which fits in a drum, the semi-diameter of which, *plus* the radius of the crank, is equal to the semi-diameter of the cylindrical casing, so that as the crank revolves some part of the periphery of the drum always touches the interior of the casing, and the two ends of the drum work in contact with the ends of the casing. The drum, which acts as a piston, does not rotate, being prevented by a partition secured to, and projecting from the interior of the casing towards its axis, and extending across the casing parallel to its axis and into a slot extending across the drum.

4728.—Greathead, J. H., Westminster, and Martindale, M. D., Anerley, Surrey, "*Improved means and apparatus for the supply of high-pressure hydrants or stand-pipes.*" Patent dated Nov. 21, 1878.

With this apparatus, a system of small pipes is employed, each of which is charged with water at a high pressure from an elevated cistern. A nozzle is introduced from one of these pipes into the hydrant stand-pipe; and, by causing a jet of the high-pressure water to issue from the nozzle into the current of low-pressure water furnished by the main, the velocity of the latter is increased, and the combined jet may be employed to command the desired height.

4730.—Gent, J. S., Manchester, "*Improvements in gas-burners.*" Application dated Nov. 21, 1878. (Void by reason of the patentee having neglected to file a specification in pursuance of the conditions of letters patent.)

The case of a burner constructed according to this invention is tubular, and is formed with an internal shoulder, above which is a small cap or gasholder able to move freely lengthwise of the case, and of such size as to leave an annular space for the passage of gas between the interior surface of the case and the cap. Above the cap is a ring of curved cross section, forming a seat against which the top of the cap may bear as a valve. The tip, in which are the exit holes for the gas, is, at its under part, of tapering form, terminating with a shank which serves as a stop for the cap, and also to heat the gas so that its combustion may be more perfect.

4760.—Duncan, G., and Wilson, W. A. and G. A., Liverpool, "*Improvements in gas motors.*" Provisional protection only obtained. Dated Nov. 22, 1878.

This gas engine is constructed with two essential parts—(1) a cylinder, piston and fittings, in which the combustion of the mixed or diffused gas or vapour and air takes place, and (2) a pump operated from the crank-shaft of the engine into which or out of which the gas or vapour and air are drawn, preferably side by side in layers, and then compressed. This compressed gas or vapour and air is allowed to pass into the working cylinder by means of automatically operated cocks, valves, or their equivalents. The mixture is then ignited by any well-known methods, and power obtained from the explosion in any of the usual ways. The engine is provided with governors, check-valves, and other appliances of the ordinary kind.

APPLICATIONS FOR LETTERS PATENT.

712.—Maughan, B. W., Cheapside, London, "An automatic apparatus for regulating the varying pressures, or controlling the supply of gas or other fluid." Feb. 18, 1880.

728.—Chandler, S. and J., Newington Causeway, London, "Improvements in gas apparatus." Feb. 18, 1880.

735.—Wilkinson, W. B., Kingston-upon-Hull, "Improvements in apparatus used with gas or other lights for holding the globes or other glasses used therewith." Feb. 19, 1880.

744.—Wright, J., Tipton, Stafford, "Improvements in apparatus for heating and purifying water." Feb. 19, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3347.—Bray, G., Leeds, Yorks, "Improvements in street and other lamps and burners, also in means employed for increasing the illuminating power, brilliancy, and steadiness of gas-flames." Aug. 19, 1879.

4340.—Williams, H., Southport, Lancs, "Improvements in and relating to atmospheric air and gas motor engines." Oct. 24, 1879.

5103.—Thomas, J. T. C., Minories, London, "Improvements in apparatus for lighting and heating purposes." Dec. 12, 1879.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

448.—Wightman, G., and Alley, S., "Improvements in water-meters." Feb. 2, 1877.

451.—Finch, B., "An improvement in valve water-closets and in water supply-valves." Feb. 2, 1877.

487.—Mather, W., "Improvements in apparatus to be used in raising water from artesian and other wells." Feb. 5, 1877.

502.—Chatwin, T., "Improvements in screw-wrenches or screw-spanners, and in gas-grips." Feb. 6, 1877.

523.—Thomas, J., "Improvements in direct-acting steam-pumps." Feb. 7, 1877.

550.—Rowatt, T., jun., "Improvements in lamp-burners." Feb. 8, 1877.

556.—Lake, W. R., "Improvements in water engines and pumps." Feb. 9, 1877.

601.—Nawrocki, G. W. von, "Improvements in water-meters." Feb. 14, 1877.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

205.—Williams, M., "Improvements in the manufacture of gas." Jan. 17, 1873.

236.—Stidder, J. G., "Improvements in apparatus for drawing and preventing waste of water from pipes, mains, cisterns, and other sources, also ball and supply valves for domestic and other purposes." Jan. 20, 1873.

274.—Patterson, R. H., "Improvements in the purification of coal gas, and in the production of alkaline sulphides to be employed for such purpose." Jan. 23, 1873.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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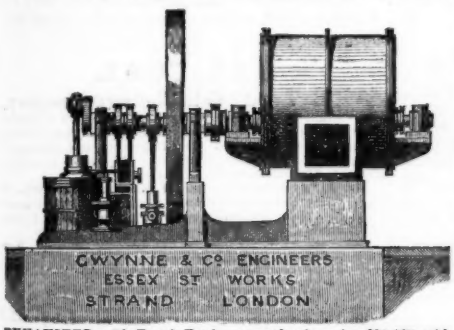

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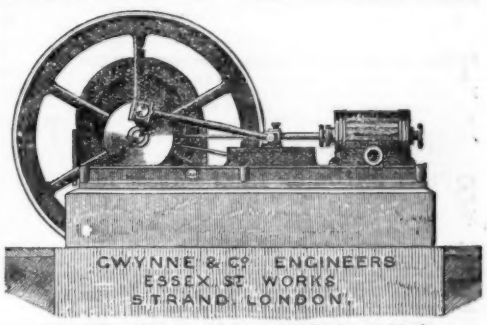
GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



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GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

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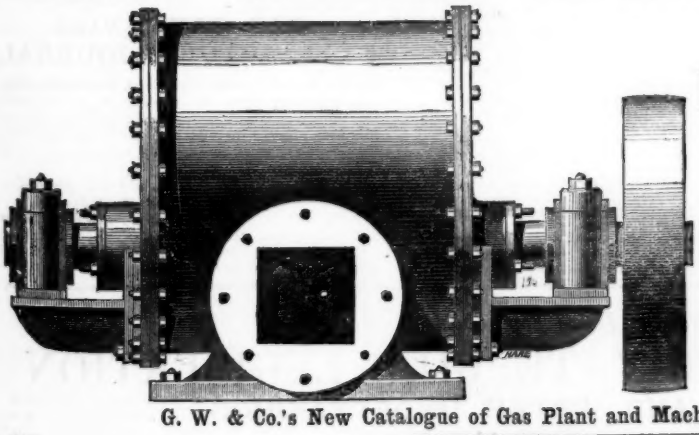

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Apply to R. K., 37, Swan Lane, Rotherhithe, LONDON.

WANTED, an Engine-Man, by the Cambridge University and Town Water-Works Company. Wages 25s. per week, with house, garden, coals, and light.
Applications to be sent in to Mr. Henry Tomlison, the Company's Engineer and Manager, 4, Bene't Street, not later than Tuesday, March 2.

WANTED, a Gas Manager for works within 25 miles of London. Make 16 millions. Must have had good experience and produced good results in the retort-house. Used to exhausters and steam engine. Salary 50s. per week; residence, fuel, and gas.
Address, with copies only of testimonials, No. 630, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager for a small Gas-Works in Gloucestershire. He must be well acquainted with the Manufacture and Distribution of Gas, Main and Service Laying, General Repairs, and the Taking of Meter Indices. Annual make under 3 million. House, coal, and gas free.
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State age, reference, and wages. None but those who can produce first-class references need apply.
Address Mr. W. R. COOPER, Gas-Works, Banbury, OXON.

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WANTED, a Gas Manager. Make 20 millions. Salary £100 per year, with house, coal, gas, water, rates, and taxes free.
Applications, stating age, &c., to be sent in not later than Saturday, March 6, 1880, addressed to the Chairman, sealed and endorsed "Gas Manager."
HENRY PICKERING, Secretary.
Northwich, Feb. 14, 1880.

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For particulars apply by letter, prepaid to Mr. G. T. ROBINSON, Clerk to the Authority, 9, Church Street, LEOMINSTER, stating wages.
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Parted with as being too small.
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WORKS for Sale, containing complete and almost new Plant for Manufacture of Muriate of Ammonia, Sal-ammoniac, and Carbonate of Ammonia. Good water frontage, ample room for extensions, and 23 years lease.
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NOTICE TO MANAGERS OF GAS COMPANIES.

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FRANK M'GEDY, Secretary.
126, Chancery Lane, London.

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TO BE SOLD—Debentures in the Truro Water-Works Company, having about 3½ years further to run, at a price that will pay the buyer 7 per cent. The debentures constitute a first mortgage on the whole of the property of the Company and form part of a series of £4000, the only amount the Company is authorized to raise by their Act of Parliament.
Applications, by letter, to be made to No. 632, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF OVER DARWEN.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the Supply of 112 RETORTS, and the necessary Bricks, Tiles, &c., for setting same.
Specifications and forms of tender may be had from the undersigned, and tenders, endorsed "Tender for Retorts," to be delivered to C. Costeker, Esq., Town Clerk, Darwen, on or before Tuesday, March 16, 1880.
THOS. DUXBURY, Manager.

GUILDFORD GASLIGHT AND COKE COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for a Supply of COAL and CANNEL for One or Two years, commencing April next. Probable quantities per year, 3000 Tons Coal, 1500 Tons Cannel.
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THE Best Continuous Method for Working Large or Small Quantities of Liquor. This is an improvement on what is known as the "Coffey Still Process." The result in sulphate of ammonia is very large, nearly every atom of ammonia gas being driven out of the liquor before it is liberated, also a saving in acid. Small Working Models to work about 5 gallons per day, with steam boiler and every requisite, sent c.o.d., carriage paid, price £4 4s.
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WILLIAM A. VALON, Engineer.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for about 490 ft. of Machine-made CLAY RETORTS, particulars of which may be obtained on application.
The Committee do not bind themselves to accept the lowest or any tender, which should be sent in not later than 2 p.m. on the 26th of February, addressed to the Chairman.
WILLIAM A. VALON, Engineer.

CORPORATION OF LEICESTER—GAS DEPARTMENT.

EXHIBITION OF GAS-ENGINES, COOKING-STOVES, BURNERS, AND OTHER APPARATUS.

THE Gas Committee of the Corporation of Leicester intend holding, from the 12th to the 17th of April next, an EXHIBITION of all kinds of Apparatus or Appliances showing the Advantages and Economies Uses of Gas for Engine, Cooking, Domestic, and other purposes. They will provide space, gas, and connections free, and give Certificates of Merit.
Intending Exhibitors will be furnished with printed conditions, forms for allotment of space, and any further information, on application to
G. A. AND C. S. ROBINSON, Managers.
Gas Offices, Millstone Lane, Jan. 23, 1880.

GAS PLANT FOR SALE.

THE Coventry Gas Company have for Sale—
PURIFIERS.—Two Sets of Four Purifiers each; each vessel 12 ft. square and 4 ft. 6 in. deep. 12 in. Connections and dry Centre-Valve (Cockey's make), Lifting Apparatus, &c., complete.
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W. L. ROBINSON, Manager.
Gas-Works, Coventry, Feb. 21, 1880.

TO IRONFOUNDERS.

THE Dover Gaslight Company invite TENDERS for certain CASTINGS, the drawings and specifications of which can be seen at my Office, or at the Office of Mr. T. N. Kirkham, 20, Abingdon Street, Westminster.
The party whose tender may be accepted will be required to enter into an agreement for the performance of his contract; but the Company do not bind themselves to accept the lowest tender.
Tenders to be sent on or before Friday, the 5th of March next, marked "Tender for Castings," addressed G. FIELDING, Secretary, Dover Gas Company, 14, Snargate Street, DOVER.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Gas Committee of the Corporation of Birmingham are prepared to receive TENDERS for the TAR to be produced at their various Works for a period of One, Three, or Seven years, from the 30th of June next.
The quantities produced in 1879 were as follows:—

Saltley Works	8,500 Tons.
Windsor Street Works	5,000 ,,
Adderley Street Works	2,500 ,,
Swan Village Works	3,000 ,,
Total	19,000 Tons.

The Committee will receive tenders, either at a fixed price per ton, or at a price to be calculated on a sliding scale, varying with the selling price of products.
The Corporation are prepared to let on lease a portion of their surplus land, on which Tar Works could be erected.
Forms of tender may be obtained on application to me.
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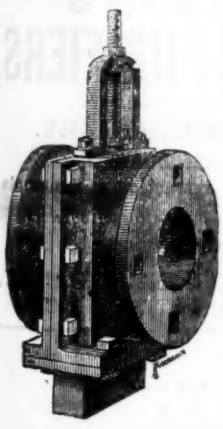

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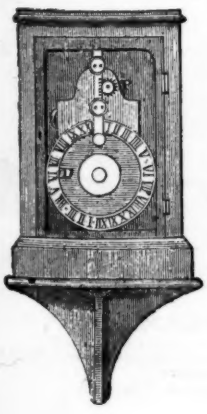

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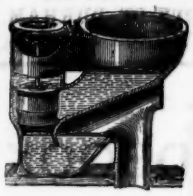

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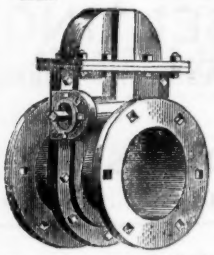

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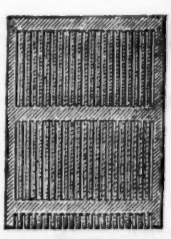

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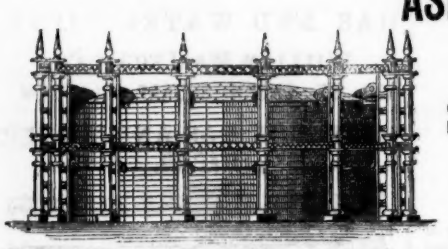

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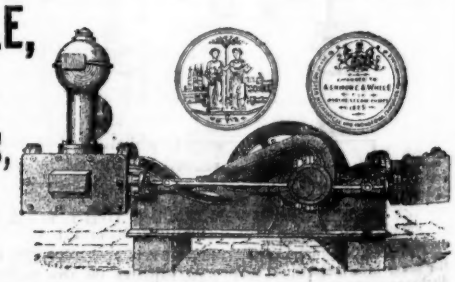

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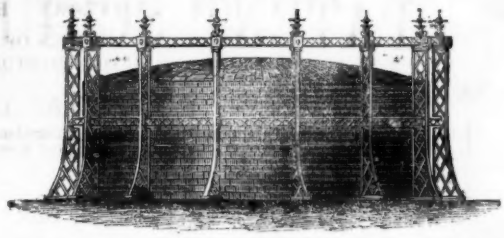

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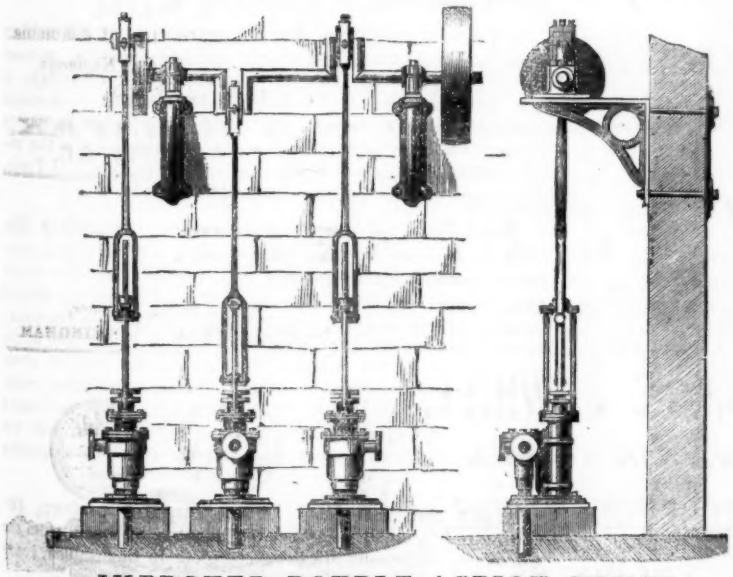

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Prices on application.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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MANUFACTURERS OF

GAS-RETORTS, FIRE-BRICKS, &c.,

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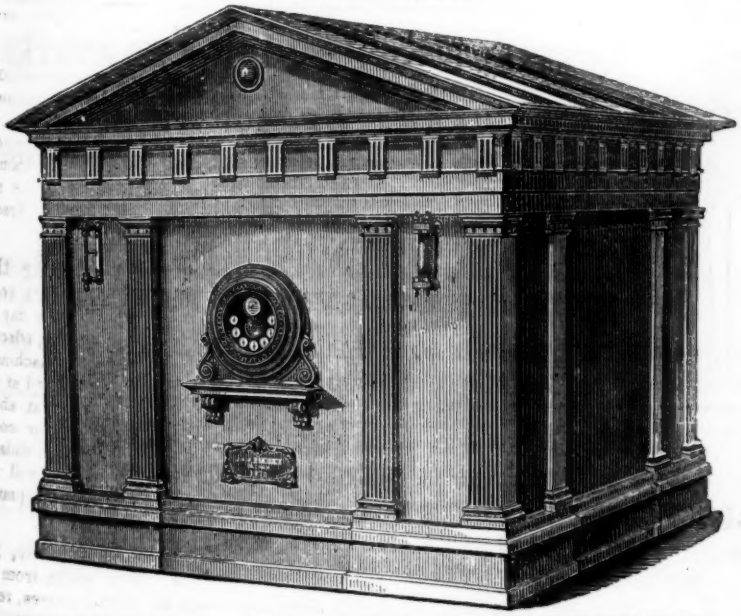

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FOR

REMOVING AND PREVENTING INCRUSTATION OF EVERY DESCRIPTION OF STEAM BOILERS; ALSO CORROSION.

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12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.

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This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

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POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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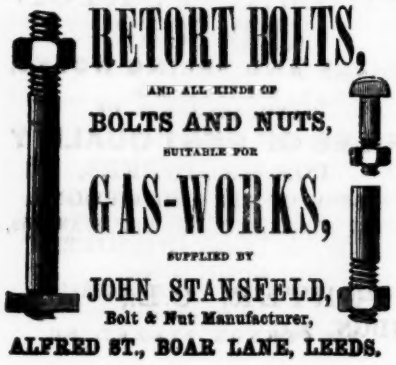

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SUITABLE FOR

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SOCKET-PIPES FOR GAS OR WATER PURPOSES,

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HOT WATER AND HOT AIR APPARATUS,

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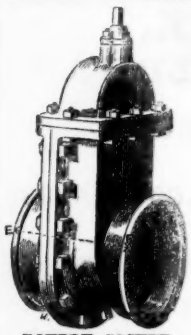

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IMPROVED SCREW-VALVES,

For Water, Tar, Ammoniacal Liquor, &c.

MADE EITHER WITH FLANGED OR SOCKET ENDS.

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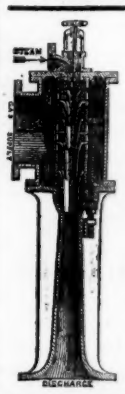

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IMPROVED CLELAND'S PATENT.

UPWARDS OF 400 IN USE.

CLELAND'S PATENT SLOW-SPEED CONDENSER, AND CLELAND'S PATENT STEAM SCRUBBER.

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STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, post free, 4s. To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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HONOURABLE MENTION
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JOSEPH CLIFF & SONS
For their Various Exhibits, amongst which is a
SILVER MEDAL
FOR THEIR
PATENT MACHINE-MADE
RETORTS AND FIRE-BRICKS,
Being the Highest Honour given for this class.

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NEAR LEEDS,
London Wharf: No. 4. Inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

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WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,
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Established 1830.

THE PORTER-CLARK PROCESS
FOR THE
SOFTENING AND FILTRATION OF WATER IN LARGE QUANTITIES, WITHIN SMALL SPACE, AT SMALL COST.
(*See* JOURNAL *of Jan.* 6, 1880.)

In an article upon the Swindon Water Supply, the *Wilts and Gloucestershire Standard* of Aug. 9, 1879, says:—
"All praise is due to the Company who have thus provided a water supply that, if it can be equalled, we are safe in saying cannot be surpassed. . . . For the information of all caterers for public health, we explain that the mode of so effectually Purifying and softening the really good and naturally wholesome water is the 'PORTER-CLARK PROCESS.' 'CLARK'S PROCESS' was known to be chemically admirable; the improvements, however, effected by Mr. Porter, mechanically, are curious as they are perfect."

The filtration is exquisite, and everything arrested is removed daily.

The Visiting Justices of the Kent County Asylum at Chartham on Aug. 29, 1879—
Resolved, "That a favourable testimonial be given to Mr. Porter for his system down to the present time, and that the Clerk forward a copy of this resolution to Mr. Porter." (50,000 gallons daily.)

The Visiting Justices of the Middlesex County Asylum, Banstead Downs, under date of Sept. 12, 1879—
Certify, "That up to the present time the 'PORTER-CLARK WATER-SOFTENING PROCESS,' which has been in operation at this Asylum for about two years, has satisfactorily answered the purposes for which it was intended." (60,000 gallons daily.)
(See *The Times*, Aug. 23, 1877, Paper by Mr. F. J. Bramwell, F.R.S., Meeting of British Association, Plymouth.)

The Proprietor of the *Daily Chronicle* and *Lloyd's Weekly News* writes, Sept. 17, 1879—
"The 'PORTER-CLARK WATER-SOFTENING PROCESS,' erected by you at my paper-mill at Sittingbourne, continues to give satisfaction, and I no longer have any trouble with my steam-boilers. I am not yet working the filters up to their full capacity, only softening about 80,000 gallons per 24 hours, whereas I could easily do more than 120,000 gallons. I may add that it only requires one man to attend to the whole operation."

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PRIZE MEDALS.

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COMBINING ALL THE LATEST IMPROVEMENTS,

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DEAR SIRS,—As the time for ordering stock for your general requirements for this year is approaching, we beg to call your attention to the various articles of our manufacture, and to solicit your early commands.

Fire-Clay Gas-Retorts.—As some of our friends appear to prefer these *machine made*, we have arranged to supply machine-made Retorts at same price as hand-made ones. At the same time, although it is to our advantage to supply machine-made, we do not recommend them, for the reason stated to you in our Circular of November, 1878. We have a very large stock of Retorts, all in good condition, and of such an assortment that we could supply any size on receipt of order.

Fire-Bricks and Fire-Clay Settings of all Shapes and Sizes.—We have a large and varied stock, or could make to special design at short notice.

Staffordshire Blue Bricks and Paving Bricks.—We shall be glad to submit prices and samples of these on hearing from you, with specification, and we venture to say our brand in these goods is unsurpassed. Hard Blue Paving Quarries make the best kind of Pavement for Retort-Houses, &c.

Coloured and White Glazed Bricks, Porcelain Baths, Kitchen Sinks, Corner Sinks, &c., we are making a great speciality of, and have no hesitation in saying that our glazed goods are unequalled for soundness of manufacture and purity of colour.

Earthenware Drain-Pipes, Cast-Iron Pipes, Wrought-Iron Tubing.—We should be glad of an opportunity of quoting you for these when you are in the market.

Lime, Cement, Plaster of Paris.—Our Lime Kilns at Brettell Lane are now in full operation, and we are in a position to supply any quantity of pure Lime manufactured only from the Earl of Dudley's best Limestone Beds. Our Cements and Plaster of Paris will withstand any required test.

References and Testimonials.—We can furnish you with any number of these; and may mention that during the last thirty-five years we supplied most of the Gas-Works in the United Kingdom and Abroad, and that we have held contracts from Her Majesty's Government for more than Twenty years consecutively.

Awaiting your esteemed favours,

We remain, Dear Sirs, your obedient servants,

HARRIS & PEARSON.

Note.—We shall be pleased to furnish Drawings and Specifications, if desired, and shall be most happy to see you or any of your Engineers here at any time; or, if you would like to see any of our representatives or ourselves at your Works, shall be glad to wait upon you by appointment.

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SOLE MAKERS OF

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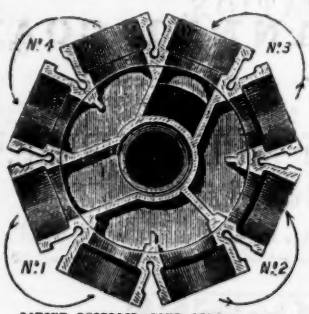
RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



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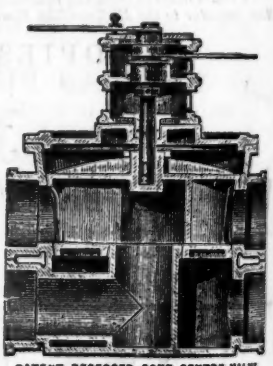

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PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE, with Opaline Reflecting Top, 12s.; with Fluted Glass Top, 10s. 6d.
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By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 7s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

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Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

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London: Printed by WALTER KING, for the Executors of the late WILLIAM BOUGHTON KING (at the office of CLAYTON and Co., 17, Bouverie Street, Fleet Street), and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, February 24, 1880.